

# Service Manual

**PIONEER®**  
The Art of Entertainment



ORDER NO.  
ARP2657

OPTICAL DISK DRIVE UNIT

# DE-UH7101

DE-UH7101 HAS THE FOLLOWING :

Type	Power Requirement	Remarks
ZUC/WL	DC power supply	

- This manual is applicable to DE-UH7101/ZUC/WL.

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# 1. SAFETY INFORMATION

This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual. Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

## WARNING

Lead in solder used in this product is listed by the California Health and Welfare agency as a known reproductive toxicant which may cause birth defects or other reproductive harm (California Health & Safety Code, Section 25249.5).

When servicing or handling circuit boards and other components which contain lead in solder, avoid unprotected skin contact with the solder. Also, when soldering do not inhale any smoke or fumes produced.

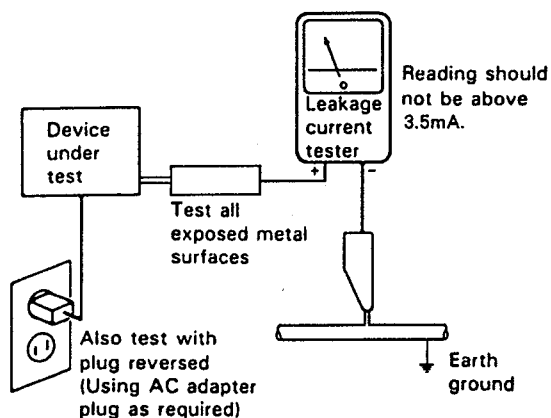
(FOR USA MODEL ONLY)

## 1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

### LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 3.5mA.



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

## 2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a  $\Delta$  on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which does not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

## (FOR EUROPEAN MODEL ONLY)

## VARO!

AVATTAESSA JA SUOJALUKITUS  
OHITETTAESSA OLET ALTTIINA  
NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE.  
ÄLÄ KATSO SÄTEESEEN.

## ADVERSEL:

USYNLIG LASERSTRÅLING VED ÅBNING  
NÅR SIKKERHEDSAFBRYDERE ER UDE AF  
FUNKTION UDGÅ UDSÆTTELSE FOR  
STRÅLING.

## VARNING!

OSYNLIG LASERSTRÅLNING NÅR DENNA  
DEL ÄR ÖPPNAD OCH SPÄRREN  
ÄR URKOPPLAD. BETRakta EJ STRÅLEN.



LASER  
Kuva 1  
Lasersäteilyn  
varoituserkki

## WARNING!

DEVICE INCLUDES LASER DIODE WHICH  
EMITS INVISIBLE INFRARED RADIATION  
WHICH IS DANGEROUS TO EYES. THERE IS  
A WARNING SIGN ACCORDING TO PICTURE  
1 INSIDE THE DEVICE CLOSE TO THE LASER  
DIODE.



LASER  
Picture 1  
Warning sign for  
laser radiation

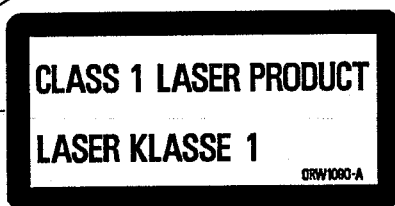
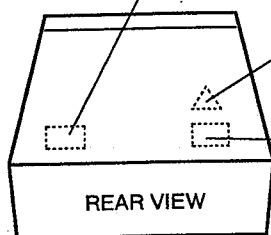
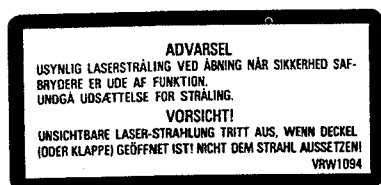
## IMPORTANT

THIS PIONEER APPARATUS CONTAINS  
LASER OF CLASS 1.  
SERVICING OPERATION OF THE APPARATUS  
SHOULD BE DONE BY A SPECIALLY  
INSTRUCTED PERSON.

## LASER DIODE CHARACTERISTICS

MAXIMUM OUTPUT POWER: 5 mw  
WAVELENGTH: 780-785 nm

## LABEL CHECK



## Additional Laser Caution

## 1. Laser Interlock Mechanism

The ON/OFF (ON : low level, OFF : high level) status of the D111 and S102 switches for detecting the loading state is detected by the drive CPU, and the design prevents laser diode oscillation when both switches D111 and S102 are not OFF (high level) (clamped state). However, the interlock operates in the test mode \*.

## 2. When the cover is opened, close viewing of the objective lens with the naked eye will cause exposure to a Class 1 laser beam.

\* : Refer to page 26.

## 2. EXPLODED VIEWS, PACKING AND PARTS LIST

### NOTES:

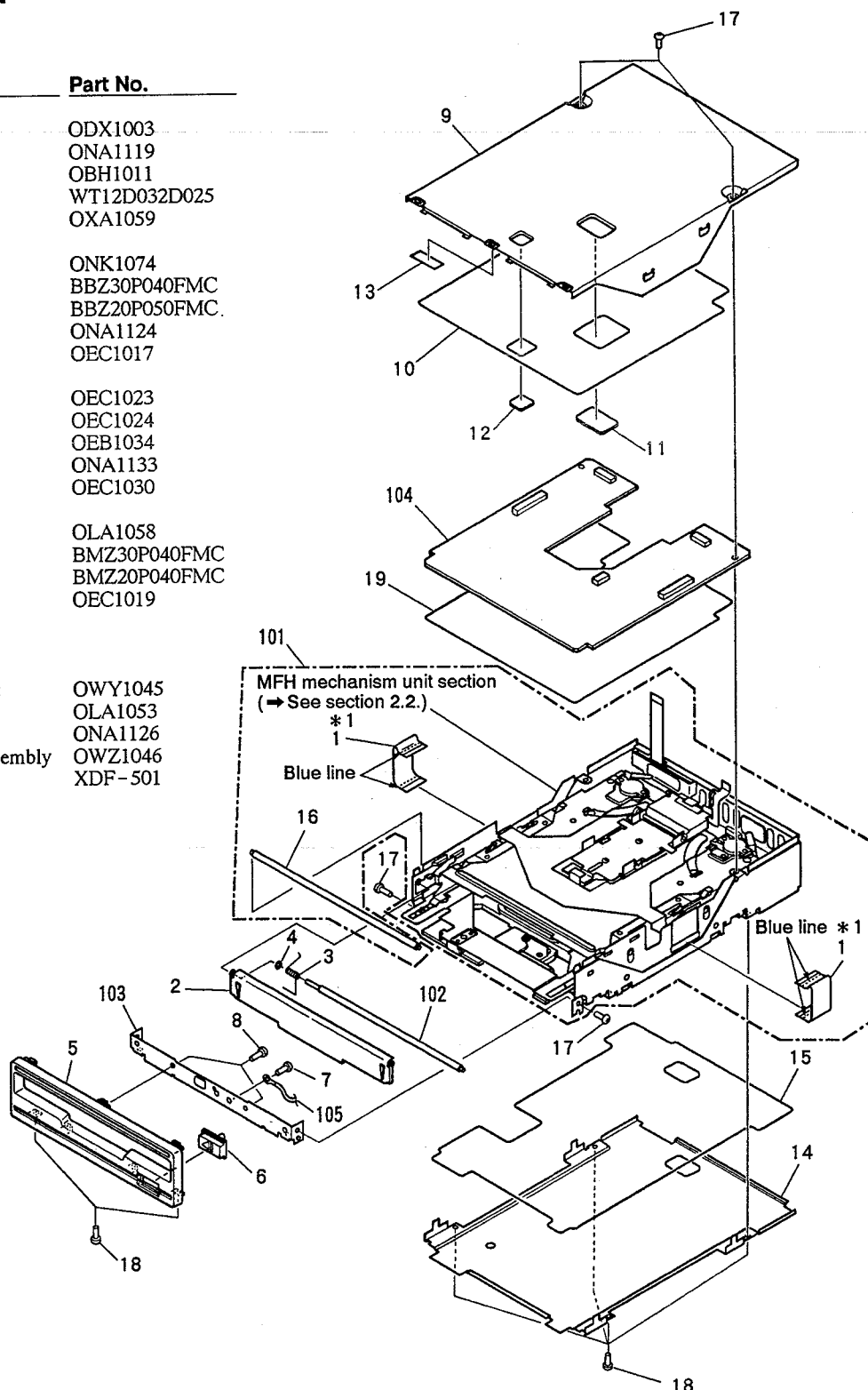
- Parts marked by "NSP" are generally unavailable because they are not in our Master Spare Parts List.
- The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

### 2.1 EXTERIOR SECTION

#### Parts List

Mark	No.	Description	Part No.
* 1	1	Fuji card/20P, 50MM	ODX1003
	2	Door	ONA1119
	3	Door sp	OBH1011
	4	Washer	WT12D032D025
	5	Front vessel assembly	OXA1059
	6	E button	ONK1074
	7	Screw	BBZ30P040FMC
	8	Screw	BBZ20P050FMC
	9	Top case	ONA1124
	10	Insulation sheet T	OEC1017
	11	Insulation pad A	OEC1023
	12	Insulation pad B	OEC1024
	13	STB pad	OEB1034
	14	Bottom plate	ONA1133
	15	Insulation sheet B	OEC1030
	16	STB bar	OLA1058
	17	Screw	BMZ30P040FMC
	18	Screw	BMZ20P040FMC
	19	Insulation sheet S	OEC1019

NSP	101	MFH mechanism unit	OWY1045
NSP	102	Door shaft	OLA1053
NSP	103	Front plate	ONA1126
NSP	104	Servo board MFH assembly	OWZ1046
NSP	105	Earth lead unit	XDF-501



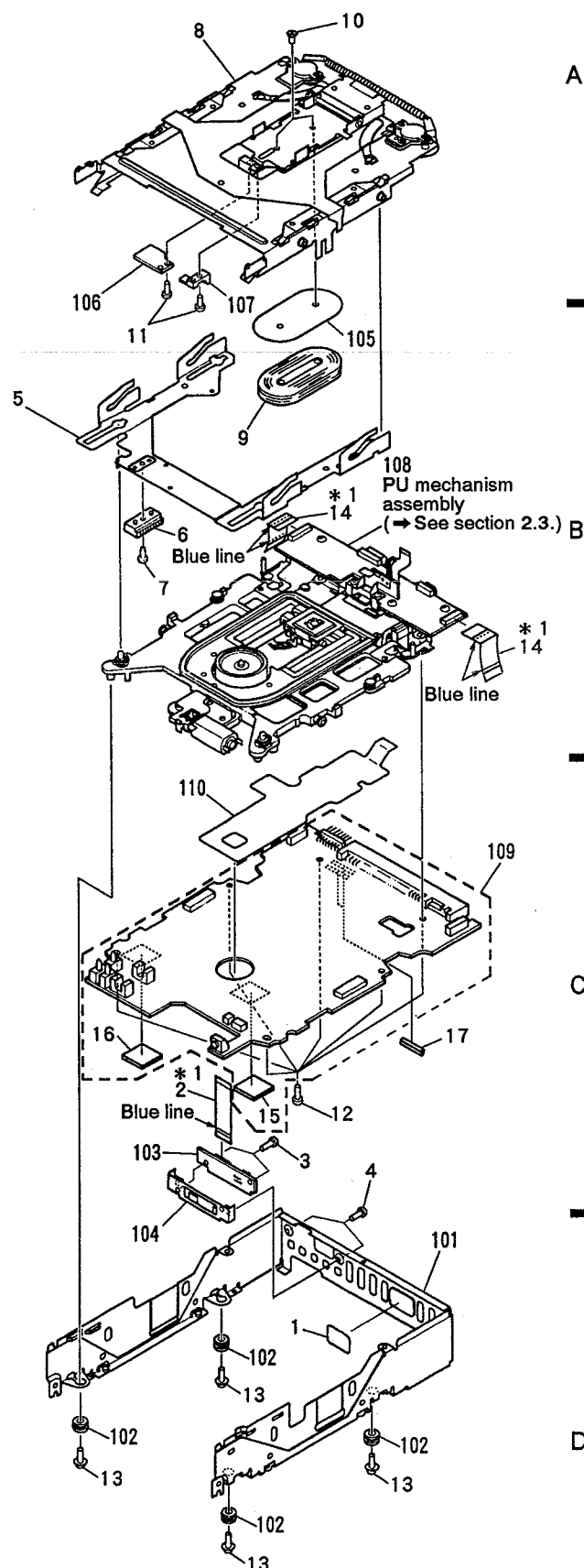
## 2.2 MFH MECHANISM UNIT SECTION

## Parts List

Mark	No.	Description	Part No.
A	1	Blind	OEC1001
	* 1	2 Fuji card/08P, 44MM	ODX1005
	3	Screw	BMZ20P040FMC
	4	Screw	PMH20P040FMC
	5	S frame assembly	OXA1062
	6	Rack	ONK1073
	7	Screw	PMA26P040FMC
	8	C holder unit	OXA1063
	9	BM coil assembly	OTL1042
	10	Screw	UGZ20P080FNI
B	11	Screw	JFZ20P030FNI
	12	Screw	BMZ30P040FMC
	13	Screw	AMZ30P040FMC
	* 1	14 Fuji card/10P, 25MM	ODX1002
	15	Drive CPU, IC(IC130)	OYW1068
	16	Controller ROM, IC(IC308)	OYW1070
	17	Terminator resistor (R309, R310)	OCN1016
	NSP	101 Chassis	ONA1117
	NSP	102 Insulator	OEB1028
	NSP	103 Changer I/F board assembly	OWZ1049
C	NSP	104 Divide PCB holder	ONA1129
	NSP	105 BM sheet	OEC1027
	NSP	106 BM connector board assembly	OWZ1047
	NSP	107 Disc guard	ONK1076
	NSP	108 PU mechanism assembly	OWY1046
	NSP	109 Main board assembly	OEA1013
	NSP	110 Slide guard sheet	OEC1028
	NSP	101 Chassis	ONA1117
	NSP	102 Insulator	OEB1028
	NSP	103 Changer I/F board assembly	OWZ1049

Note:

\* 1; Handle the Fuji card with care in order not to break. When attaching the Fuji card, observe the blue lines on the card (see the figure) and firmly insert it to the end.



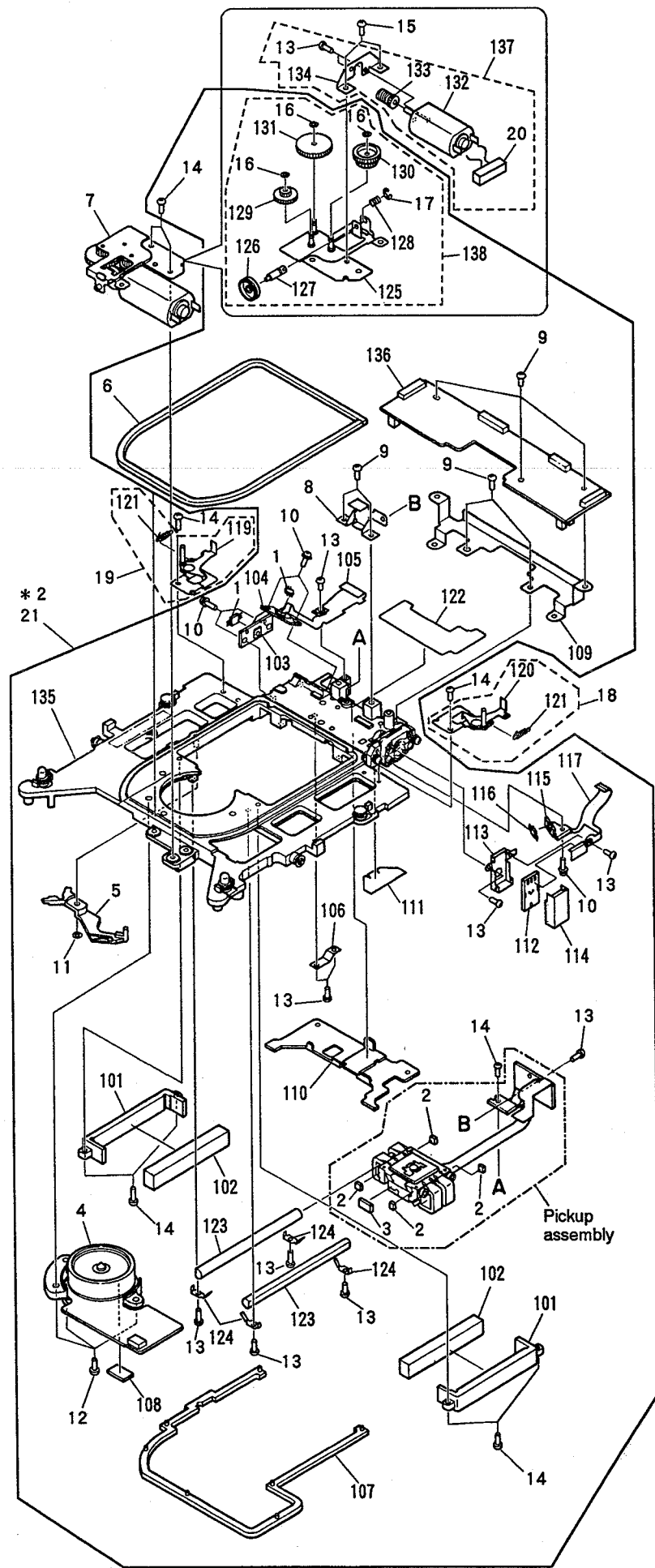
## 2.3 PU MECHANISM ASSEMBLY

## Parts List

Mark	No.	Description	Part No.	Mark	No.	Description	Part No.
	1	Silicone photo diode	S2856-04	NSP	101	C yoke	ONH1030
	2	Cushion	OEB1032	NSP	102	C magnet	OMF1008
	3	C lock cushion	OEB1030	NSP	103	PD holder A	ONA1103
	4	Spindle motor	OXM1012	NSP	104	PD holder B	ONA1104
	5	C lock arm	ONK1065	NSP	105	PD flexible 130	ONP1077
	6	Pad	OEB1027	NSP	106	Lens spring	OBK1024
	7	Loading drive assembly	OWY1051	NSP	107	Spacer	ONK1081
	8	BM support	ONA1125	NSP	108	Spacer sheet	OEC1029
	9	Screw	BMZ30P040FMC	NSP	109	PCB support	ONA1122
	10	Screw	PMH20P060FMC	NSP	110	PU cover assembly	OXX1007
	11	Washer	WT26D047D050	NSP	111	LD seal	OEC1022
	12	Screw	BMZ30P060FMC	NSP	112	OSC board MFH assembly	OWX1083
	13	Screw	JFZ20P030FNI	NSP	113	OSC case A	ONA1105
	14	Screw	BMZ20P040FMC	NSP	114	OSC case B	ONA1106
	15	Screw	PMH20P040FMC	NSP	115	MD holder	ONK1061
	16	Washer	WT16D032D050	NSP	116	PIN photo diode	PN3405-SL
	17	E ring	YE15FUC	NSP	117	LD flexible 130	ONP1078
	18	C sensor R unit	OWY1052		118	• • • • •	
	19	C sensor L unit	OWY1055	NSP	119	C sensor L assembly	OXA1057
	20	Connector assembly	ODF1008	NSP	120	C sensor R assembly	OXA1058
* 2	21	Mechanism unit	OYM1030	NSP	121	C sense SP	OBH1010
				NSP	122	Cover sheet	OEC1016
				NSP	123	C shaft	OLA1043
				NSP	124	S spring	OBK1026
				NSP	125	Gear base assembly	OXA1056
				NSP	126	ME gear	ONK1075
				NSP	127	ME shaft	OLA1054
				NSP	128	MESP	OBH1009
				NSP	129	Gear B	ONK1070
				NSP	130	Gear A	ONK1069
				NSP	131	Gear C	ONK1071
				NSP	132	Motor	VXM1045
				NSP	133	Worm	ONK1072
				NSP	134	Motor bracket	ONA1121
				NSP	135	PU frame assembly	OXA1052
					136	PU board assembly	OEA1015
				NSP	137	Loading motor unit	OWY1050
				NSP	138	Gear base unit	OWY1049

Note:

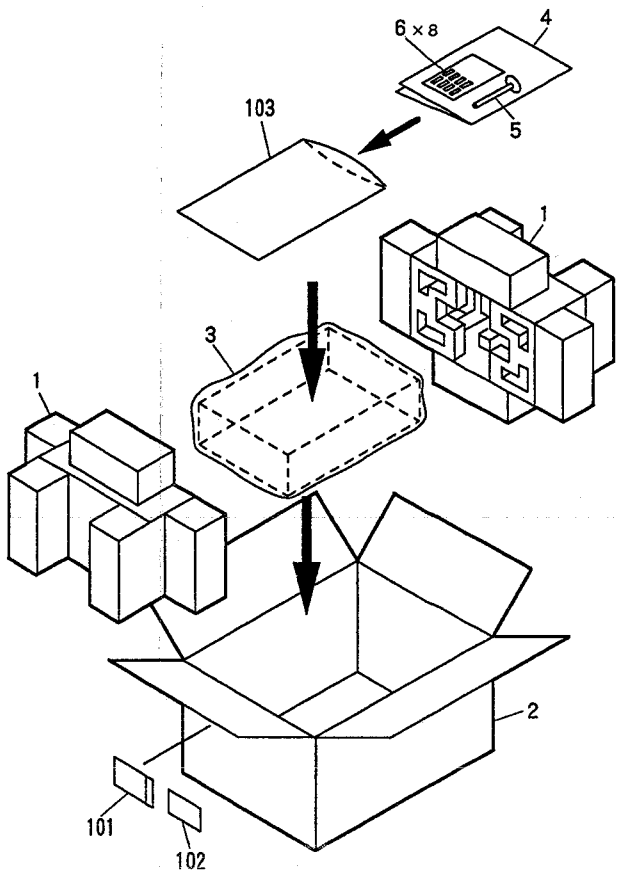
\* 2 ; Include Rack, ONK1073 and S frame assembly, OXA1062.  
(Refer to page 5.)



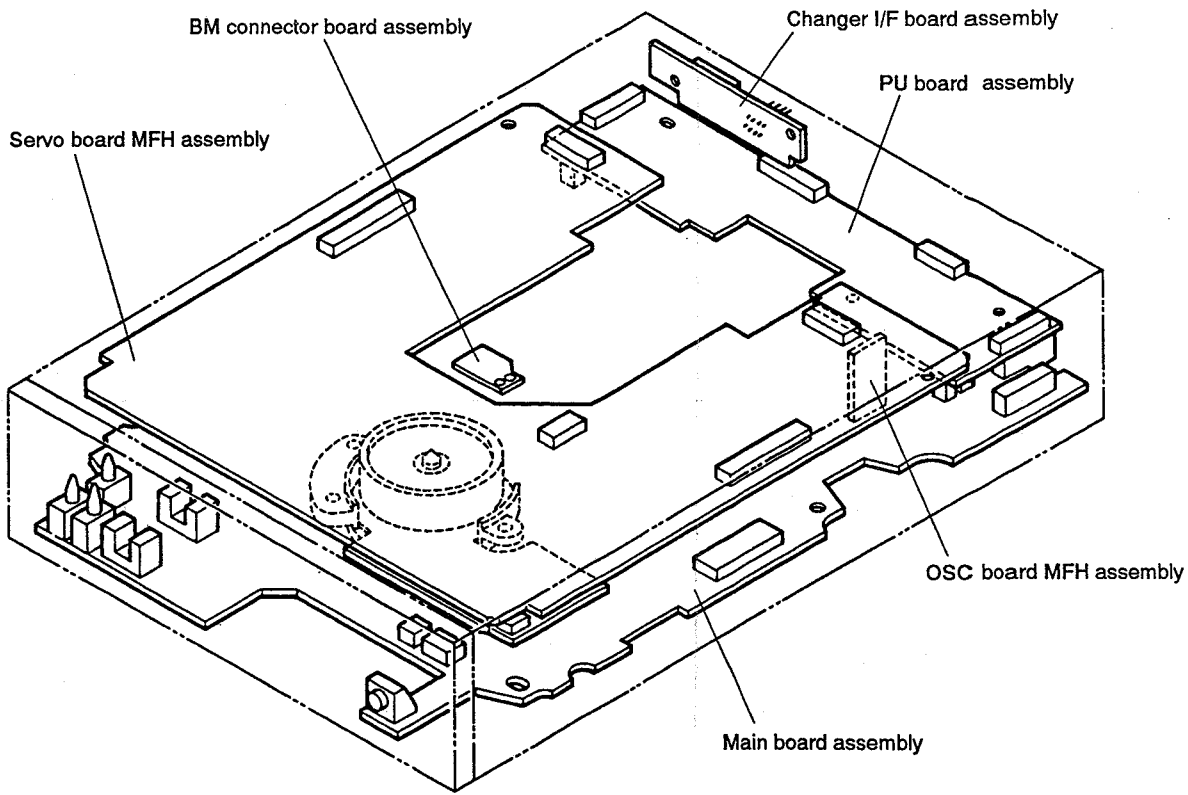
2.4 PACKING

Parts List

Mark	No.	Description	Part No.
	1	Pad	OHA1029
	2	Packing case	OHG1099
	3	Packing bag	OHL1020
	4	Operating instructions (Japanese, English, French, German)	ORM1052
	5	Screwdriver	NDV3
	6	Short pin	OKX1005
NSP	101	Follow card bag	DHL1011
NSP	102	Follow up card	DRY1032
NSP	103	Polyethylene bag	Z21-019



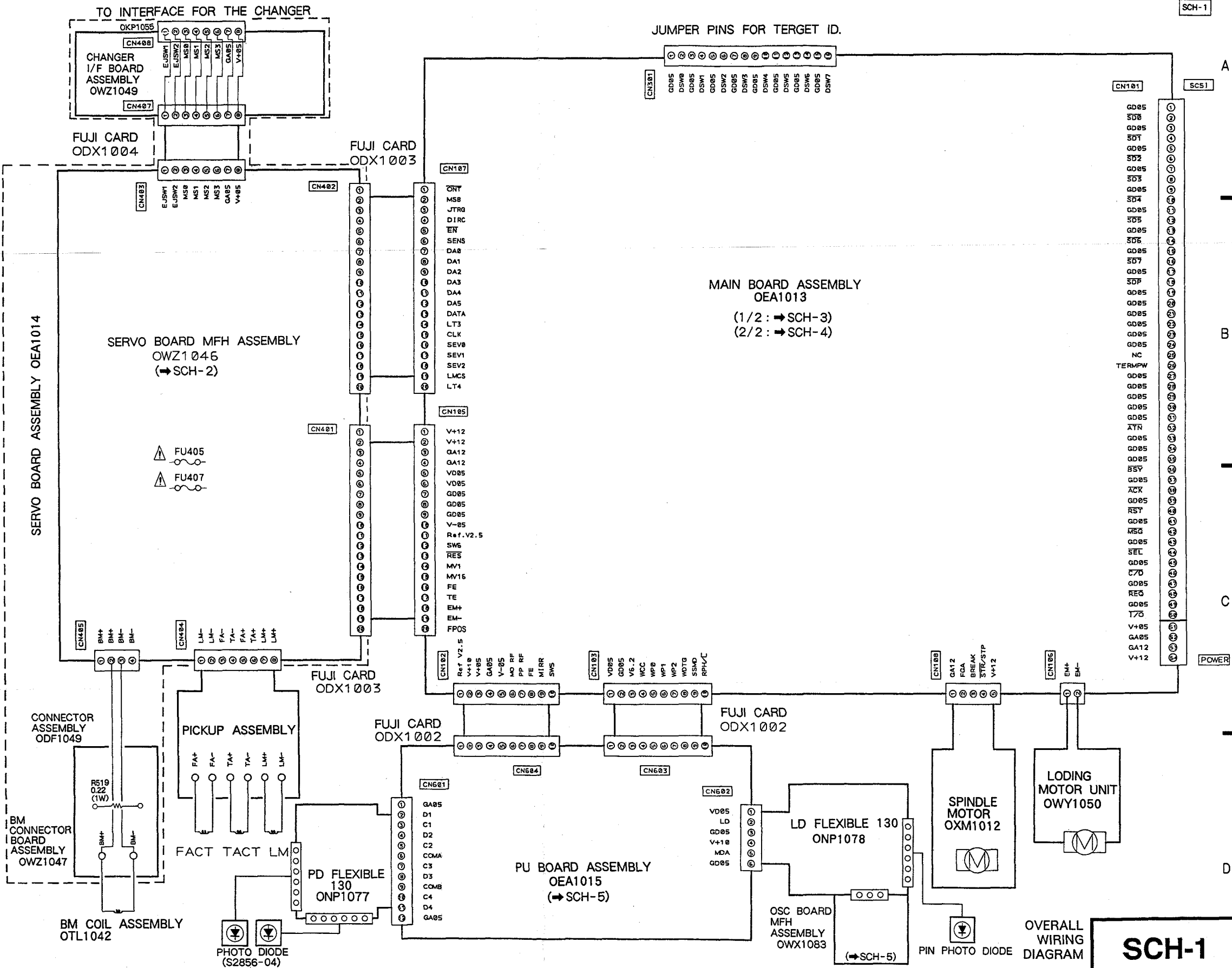
3. PCB LOCATION



4. SCHEMATIC DIAGRAMS

4.1 OVERALL WIRING DIAGRAM

- Note: (Type 4)
1. When ordering service parts, be sure to refer to "PARTS LIST of EXPLODED VIEWS" or "PCB PARTS LIST".
2. Since these are basic circuits, some parts of them or the values of some components may be changed for improvement.
3. RESISTORS:  
Unit: kΩ, MΩ, or Ω unless otherwise noted.  
Rated power: 1/4W, 1/8W, 1/10W unless otherwise noted.  
Tolerance: (F): ±1%, (G): ±2%, (K): ±10%, (M): ±20% or ±5% unless otherwise noted.
4. CAPACITORS:  
Unit: pF or μF unless otherwise noted.  
Ratings: capacitor (μF) / voltage (V) unless otherwise noted.  
Rated voltage: 50V except for electrolytic capacitors.
5. COILS:  
Unit: mH or μH unless otherwise noted.
6. VOLTAGE AND CURRENT:  
□ : DC voltage (V) in PLAY mode unless otherwise noted.  
⇐ mA or ⇐ mA: DC current in PLAY mode unless otherwise noted.  
Value in ( ) is DC current in STOP mode.
7. OTHERS:  
• → : Signal route.  
• ⊗ : Adjusting point.  
• ▼ (Red) : Measurement point.  
• The Δ mark found on some component parts indicates the importance of the safety factor of the parts. Therefore, when replacing, be sure to use parts of identical designation.
8. SWITCHES (Underline indicates switch position):  
MAIN BOARD ASSEMBLY  
S101: EJECT  
S102: Carriage sense hole detector (effective surface/ineffective surface)  
S103: Carriage sense hole detector (Write protect)  
S104: Carriage sense hole detector (High reflectance)
9. For SCH-□ on the schematic diagram  
• SCH-□ indicates the drawing number of the schematic diagram.  
(SCH stands for schematic diagram.)
- Check after fuse replacement  
To eliminate damage due to a thermal shock, be sure to perform a continuity test for the fuse after you change it. The resistance is approximately 0.15 ohms.



SCH-1

OVERALL  
WIRING  
DIAGRAM

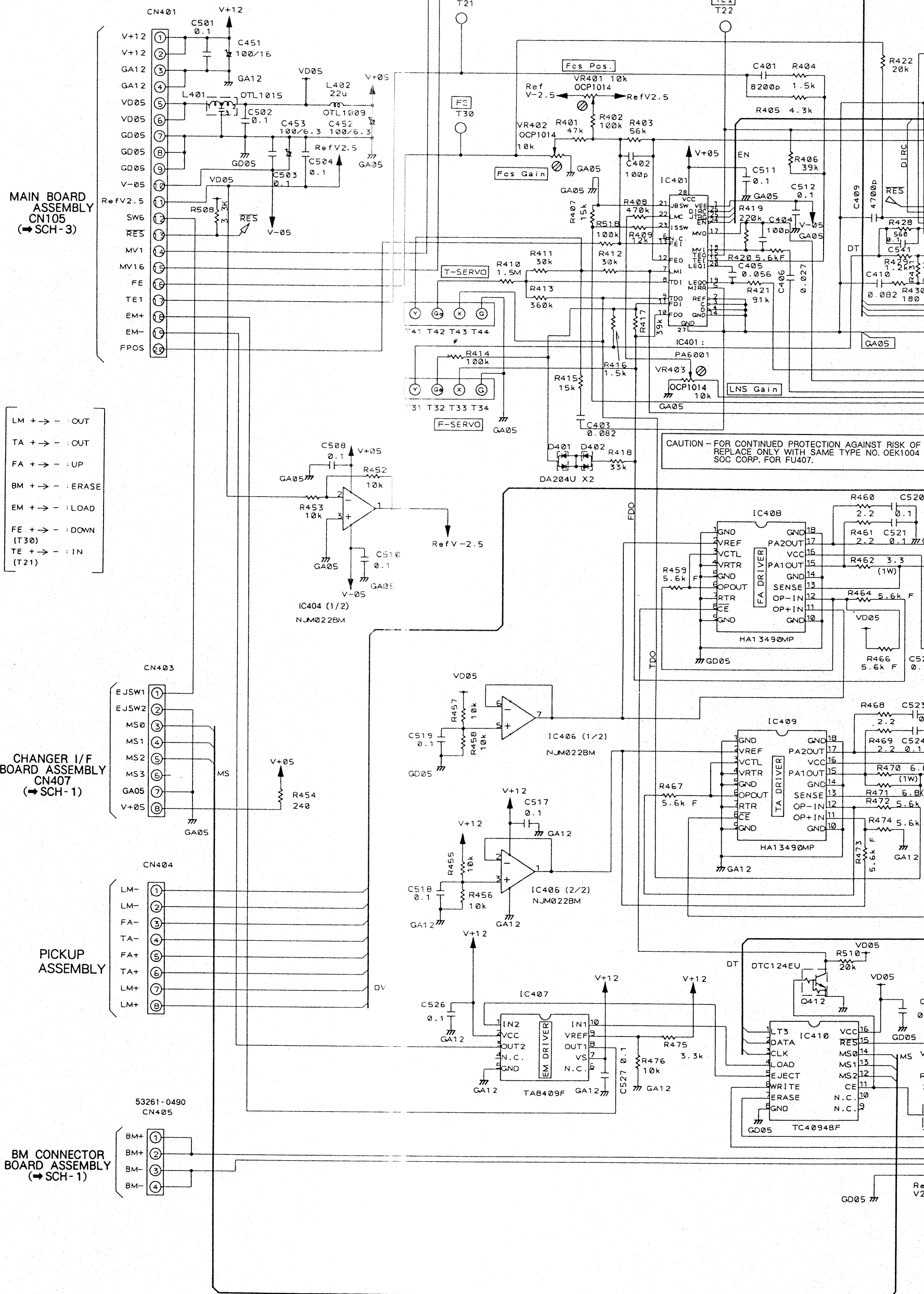
SCH-1

OVERALL  
WIRING  
DIAGRAM



# 4.2 SERVO BOARD MFH ASSEMBLY

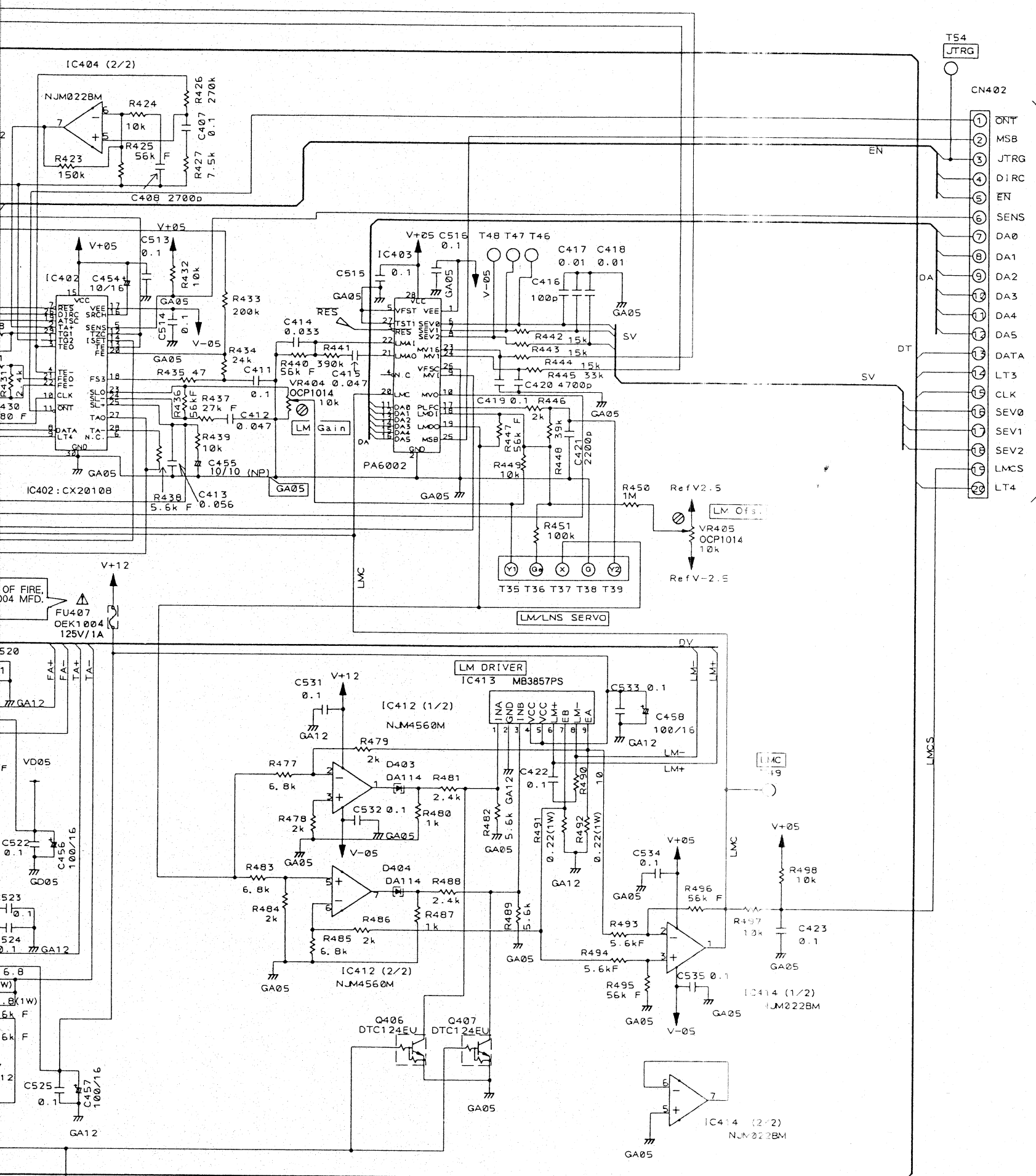
## SERVO BOARD MFH ASSEMBLY OWZ1046



SCH-2

SERVO BOARD  
MFH ASSEMBLY

SCH-2



## 4.3 MAIN BOARD ASSEMBLY (1/2)

MAIN BOARD ASSEMBLY (1/2) OEA1013

A

B

C

D

E

F

PU BOARD  
ASSEMBLY  
CN604  
(→SCH-5)

PU BOARD  
ASSEMBLY  
CN603  
(→SCH-5)

TO POWER  
CN101(2/2)  
V+05  
GA05  
GA12  
V+12  
OKP1041

SCH-3

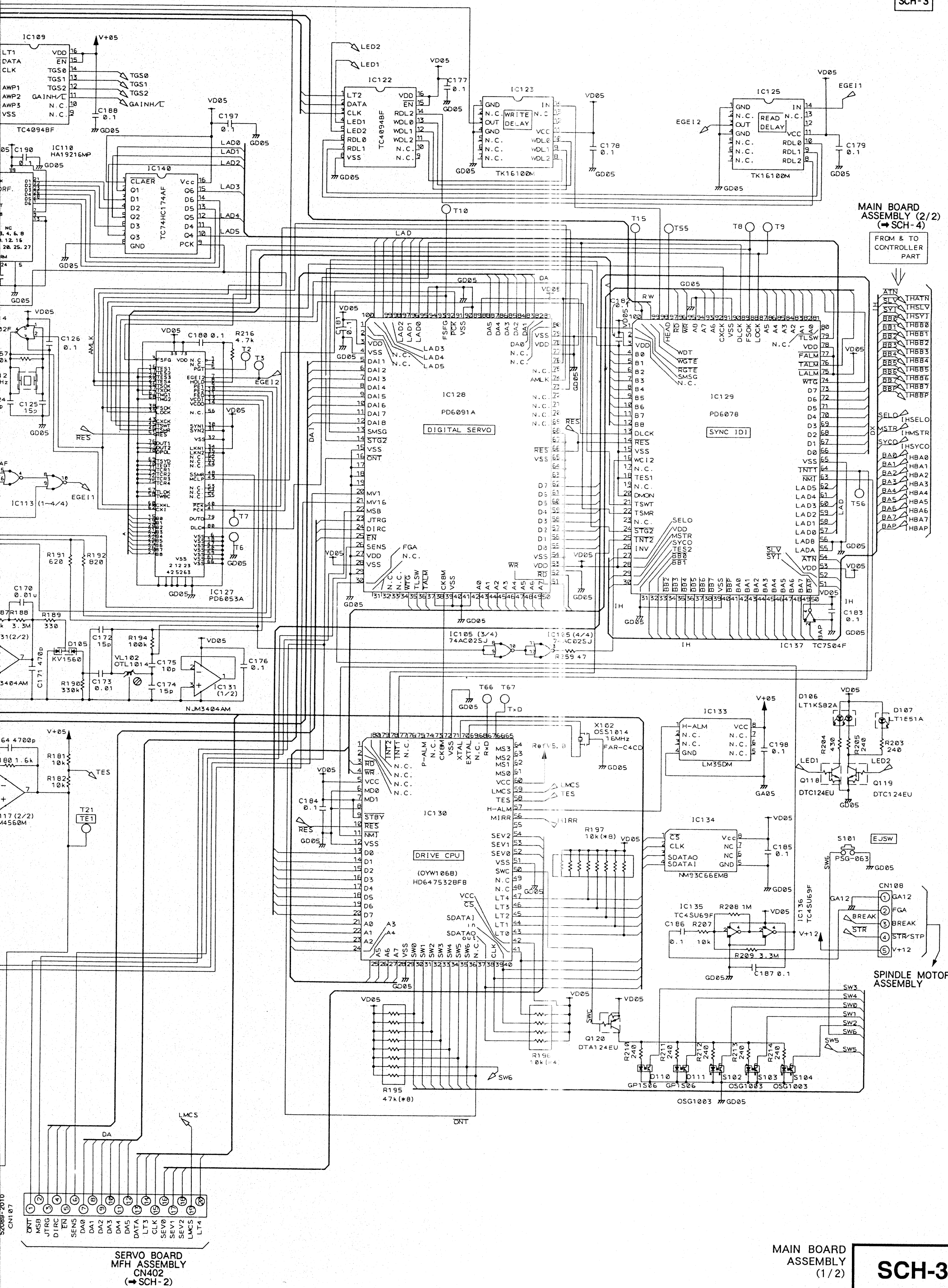
MAIN BOARD  
ASSEMBLY  
(1/2)

SERVO BOARD  
MFH ASSEMBLY  
CN401  
(→SCH-2)

LOADING MOTOR  
UNIT

52089-2010  
CN107

SCH-3



SERVO BOARD  
MFH ASSEMBLY  
CN402  
(→SCH-2)

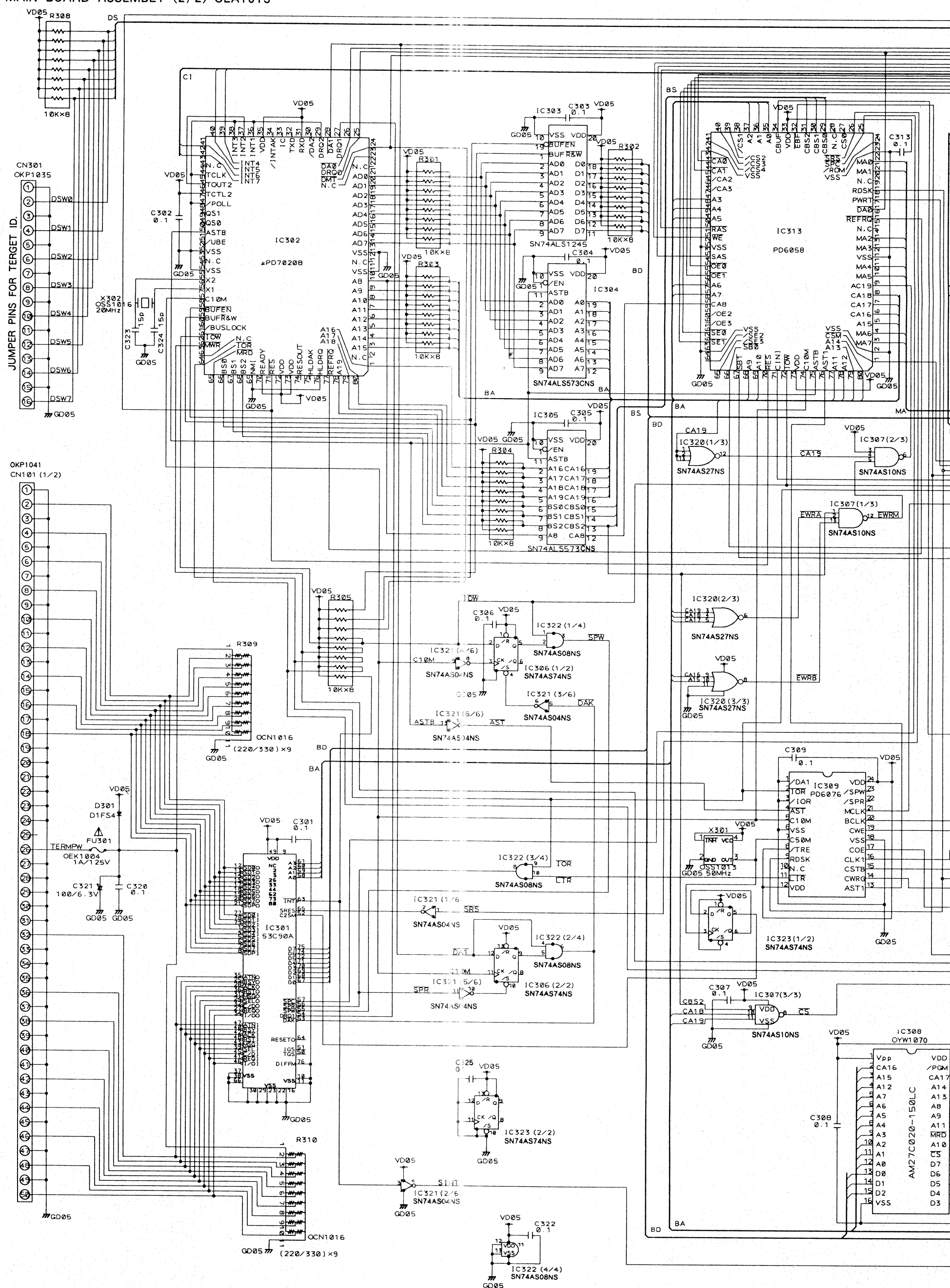
MAIN BOARD  
ASSEMBLY  
(1/2)

**SCH-3**

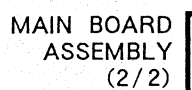


1	2	3	4
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A MAIN BOARD ASSEMBLY (2/2) OEA1013

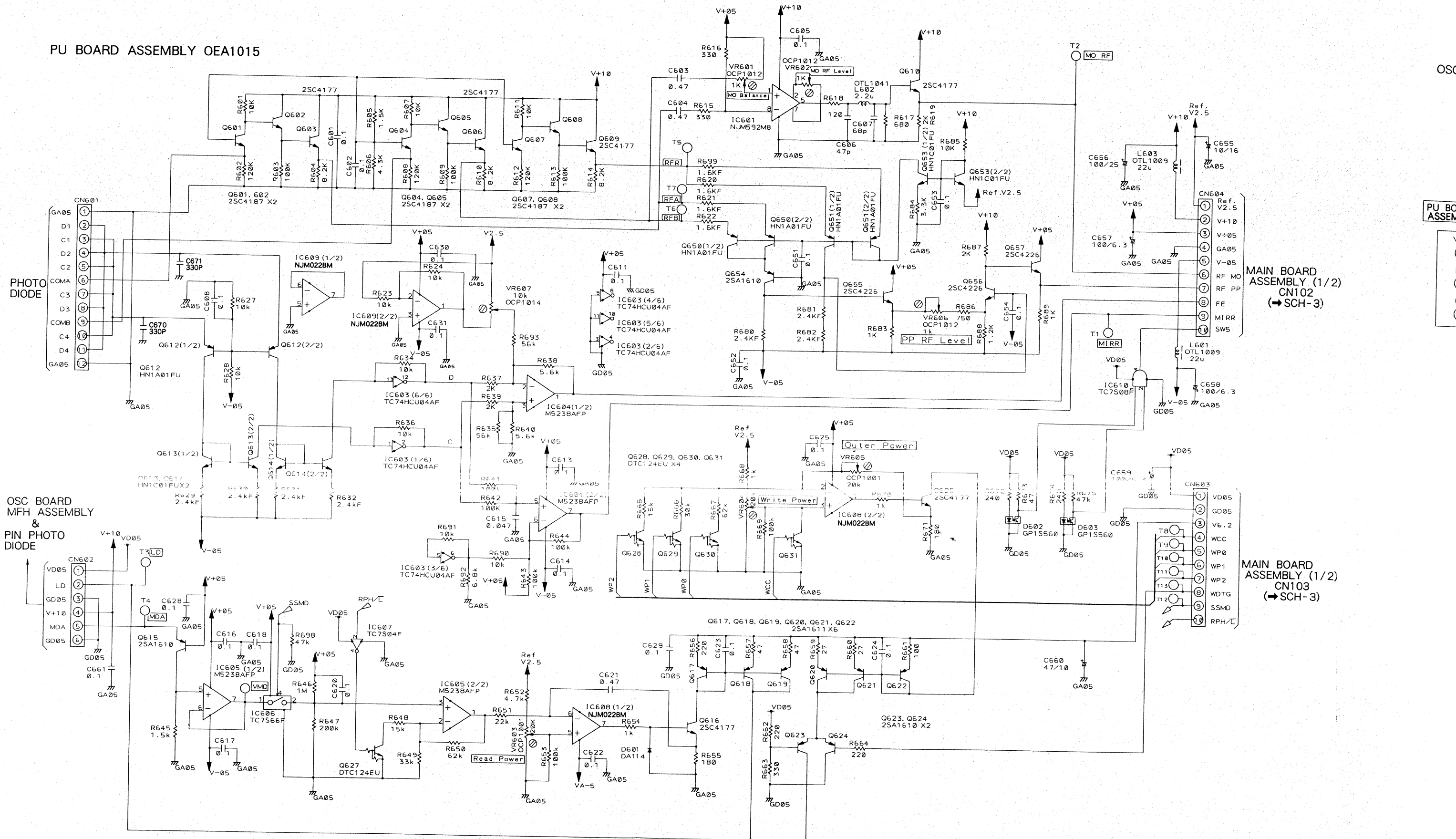


## MAIN BOARD ASSEMBLY (2/2)



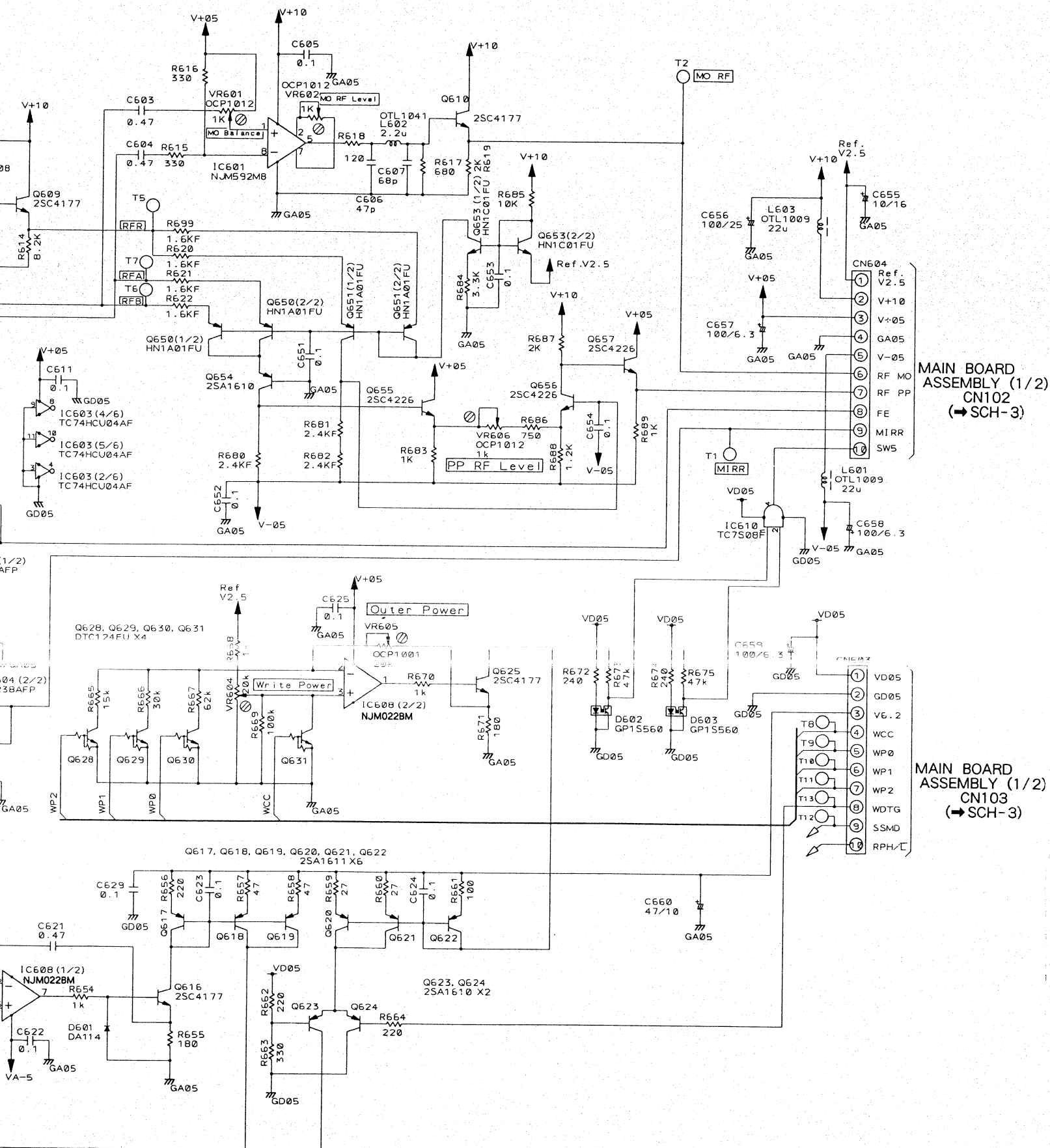
# 4.5 PU BOARD AND OSC BOARD MFH ASSEMBLIES

PU BOARD ASSEMBLY OEA1015

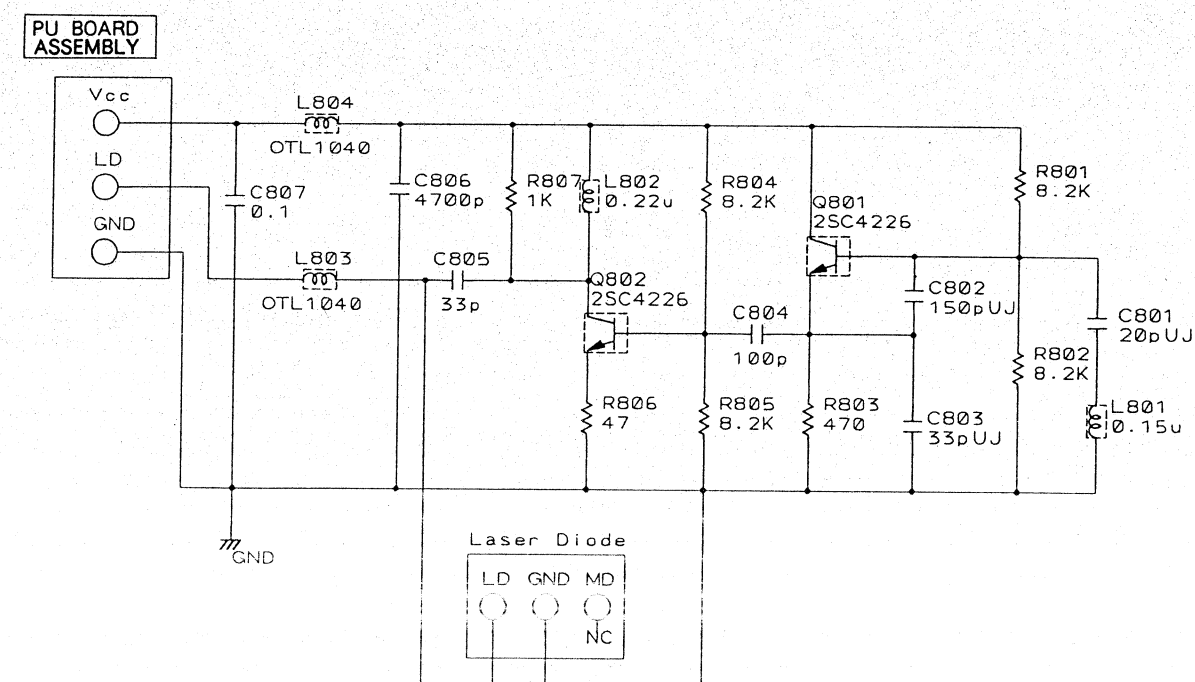


SCH-5

PU BOARD  
AND  
OSC BOARD MFH  
ASSEMBLIES



OSC BOARD MFH ASSEMBLY OWX1083



PU BOARD  
AND  
OSC BOARD MFH  
ASSEMBLIES

**SCH-5**



## 5. PCB PARTS LIST

**NOTES:**

- Parts marked by "NSP" are generally unavailable because they are not in our Master Spare Parts List.
- The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "◎" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).

560 Q  $\rightarrow 56 \times 10^1 \rightarrow 561$ ..... RD1/8PM 561J

47k O  $\rightarrow 47 \times 10^3 \rightarrow 473$ ..... RD1/4PS 4 7 3 J

0.5 Q → 0R5 ..... RN2H 0 R 5 K

10 → 010.....RSIP 010K

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62k  $\Omega \rightarrow 562 \times 10^1 \rightarrow 5621 \dots\dots\dots$  RN1/4PC **5****6****2****1**F

[illegible]

Mark	No.	Description	Part No.
	D104		RB400D
	D103		RD6. 2MB1
<b>SWITCHES</b>			
	S102-S104		OSG1003
	S101		PSG-063
<b>FUSE</b>			
	FU301 (1A)		OEK1004
<b>COILS</b>			
	VL102		OTL1014
	L104, L105, L109, L110		OTL1009
	L106, L107		OTL1015
	L108		OTL1038
	L103		OTL1039
	L101		OTL1041
<b>CAPACITORS</b>			
	C113		CCSQCH080D50
	C108, C122, C123		CCSQCH101J50
	C124, C125, C172, C323, C324		CCSQCH150J50
	C118		CCSQCH220J50
	C192		CCSQCH221J50
	C191		CCSQCH470J50
	C175		CCSQSH100D50
	C174		CCSQSH150J50
	C167		CCSQSL272J50
	C149, C171		CCSQSL471J50
	C134, C170, C173		CKSQYB103K50
	C105, C106, C112, C114, C115, C159, C186		CKSQYB104K25
	C168		CKSQYB222K50
	C161, C164		CKSQYB472K50
	C155		CKSQYB823K25
	C102-C104, C109-C111, C116, C117, C119-C121, C126, C128-C132, C135, C136, C138-C140, C143-C146, C153, C154, C156-C158, C160, C163, C166, C169, C176-C185, C187-C190, C197, C198, C210, C301-C320, C322, C325		CKSQYF104Z50
	C127, C133, C141, C142, C162, C195, C199		OCH1011
	C147		OCH1022
	C148		OCH1025
	C150-C152, C321 (100 $\mu$ F/6.3)		RCH1072
<b>RESISTORS</b>			
	VR101, VR102		OCP1014
	R197, R301-R308		OCN1007
	R196		OCN1009
	R169		OCN1019
	R195		OCN1020
	R185, R186		RS1/10S274F
	Other resistors		RS1/10S□□□J
<b>OTHERS</b>			
	CN102, CN103	Connector	52030-1010
	CN105, CN107	Connector	52089-2010
	CN301	Connector (16P)	OKPI035
	CN101	SCSI/Power supply connector	OKPI041
		IC socket	OKH1013

Mark	No.	Description	Part No.
		IC socket	OKH1017
	X101	Crystal resonator (29MHz)	OSS1012
	X301	Crystal oscillator (50MHz)	OSS1013
	X102	FAR resonator (16MHz)	OSS1014
	X302	Crystal resonator (20MHz)	OSS1016

**SERVO BOARD MFH ASSEMBLY****SEMICONDUCTORS**

IC402	CX20108
IC408, IC409	HA13490MP
IC413	MB3857PS
IC404, IC406, IC414	NJM022BM
IC416	NJM3404AM
IC412	NJM4560M
IC401	PA6001
IC403	PA6002
IC407	TA8409F
IC410	TC4094BF
IC415	TC74HC00AF
IC418	TD62M4700F
Q403, Q404	2SA1615
Q401, Q402, Q408, Q411	2SC4177
Q405-Q407, Q409, Q410, Q412	DTC124EU
D403, D404	DA114
D401, D402	DA204U

**FUSES**

FU405, FU407 (1A)	OEK1004
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**COILS**

L402	OTL1009
L401	OTL1015

**CAPACITORS**

C402, C404, C416	CCSQCH101J50
C425	CCSQSL102J50
C454	CEAL100M16
C452, C453, C459	CEAS101M6R3
C455	CEJANP100M10
C417, C418	CKSQYB103K50
C407, C411, C419	CKSQYB104K25
C421	CKSQYB222K50
C408	CKSQYB272K50
C406	CKSQYB273K25
C414	CKSQYB333K25
C409, C420	CKSQYB472K50
C412, C415	CKSQYB473K25
C405, C413	CKSQYB563K25
C401	CKSQYB822K50
C403, C410	CKSQYB823K25
C422, C423, C501-C504, C508, C510-C528, C531-C536, C538-C541	CKSQYF104Z50
C451, C456-C458	OCH1026

Mark	No.	Description	Part No.
<b>RESISTORS</b>			
	VR401-VR405		OCP1014
	R430, R506		RS1/10S181F
	R437		RS1/10S273F
	R420, R438, R459, R464, R466, R467, R472-R474, R482, R489, R493, R494		RS1/10S562F
	R403, R425, R436, R440, R447, R495, R496 R462		RS1/10S563F
	R470, R471		RS1PMF3R3J
	R491, R492		RS1PMF6R8J
	R507		RS1PMFR22J
	Other resistors		RS1PMFR47J
			RS1/10S□□□J

**OTHERS**

CN405	Connector	53261-0490
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**BM CONNECTOR BOARD ASSEMBLY****RESISTOR**

R519	RS1PMFR22J
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**OTHERS**

BM connection connector assembly ODF1057

**CHANGER I/F BOARD ASSEMBLY****OTHERS**

CN408	Pin header (08P)	OKP1055
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**PU BOARD ASSEMBLY****SEMICONDUCTORS**

IC604, IC605	M5238AFP
IC608, IC609	NJM022BM
IC601	NJM592M8
IC603	TC74HCU04AF
IC607	TC7S04F
IC610	TC7S08F
IC606	TC7S66F
Q615, Q623, Q624, Q654	2SA1610
Q617-Q622	2SA1611
Q603, Q606, Q609, Q610, Q616, Q625	2SC4177
Q601, Q602, Q604, Q605, Q607, Q608	2SC4187
Q655-Q657	2SC4226
Q627-Q631	DTC124EU
Q612, Q650, Q651	HN1A01FU
Q613, Q614, Q653	HN1C01FU
D601	DA114
D602, D603	GP1S560

**COILS**

L601, L603	OTL1009
L602	OTL1041

Mark	No.	Description	Part No.
<b>CAPACITORS</b>			
	C606		CCSQCH470J50
	C607		CCSQCH680J50
	C670, C671		CKDYB331K50
	C615		CKSQYB473K25
	C601, C602, C605, C608, C611, C613, C614, C616-C618, C620, C622-C625, C628-C631, C651-C654, C661		CKSQYF104Z50
	C603, C604, C621		CKSQYF474Z16
	C655		OCH1011
	C656		OCH1022
	C660		OCH1027
	C657-C659 (100 $\mu$ F/6.3)		RCH1072

**RESISTORS**

VR603-VR605	OCP1001
VR601, VR602, VR606	OCP1012
VR607	OCP1014
R620-R622, R699	RS1/10S162F
R629-R632, R680-R682	RS1/10S242F
Other resistors	RS1/10S□□□J

**OSC BOARD MFH ASSEMBLY****SEMICONDUCTORS**

Q801, Q802	2SC4226
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**COILS**

L801	OTL1035
L802	OTL1036
L803, L804	OTL1040

**CAPACITORS**

C804	CCSRCH101J50
C805	CCSRCH330J50
C802	CCSRUJ151J50
C801	CCSRUJ200J50
C803	CCSRUJ330J50
C806	CKSRYB472K50
C807	CKSRYF104Z25

**RESISTORS**

R806	RS1/10S470J
Other resistors	RS1/16S□□□J

## 6. TEST PROGRAM PROCEDURES

Use the IBM PC - AT host computer and GGF1062 test program for testing. This test program can be used with the DD - 5001 Series, DD - 5101 Series, DE - 7001 Series and DE - 7101 Series.

For the DE - 7101 Series, test the Rewritable Mode and WORM Mode by changing the DIP switch settings. Use an optical disk for the Write Test (No format utility program is required to use the disk).

### 6.1 Overview

The test consists of four steps. Step 1 performs the controller diagnostics, Step 2 confirms the media condition, Step 3 issues commands and performs media initialization, and Step 4 performs the Aging Test.

Aging is a normal Seek Test (only the READ command does not perform error correction), and a Write/Read Test can be performed as an option. The three types of aging are as follows:

- [Butterfly]: Optical head accesses while alternating between the inner tracks and outer tracks and proceeds toward the tracks.
- [Random]: Optical head accesses tracks randomly.
- [Constant]: Optical head accesses alternating between two specified tracks zone only.

### 6.2 Items Required for Testing

The following items are required for testing:

- 1) IBM PC-AT system
- 2) DDI-80AT interface board
- 3) Power cord and SCSI cable
- 4) System software with test software included
- 5) Optical disk for testing

#### 1. Test software

Register ANSI.SYS as the device in the CONFIG.SYS statement.

- Printer output

Test software example:

: ENTER Key

B: \ > dir

COMMAND	COM	24931	88-07-13	0:00
CONFIG	SYS	21	90-03-08	10:08
PRINT	SYS	5855	88-07-13	0:00
SVC	EXE	74222	90-03-08	1:00
SVC	CTL	184	90-03-08	1:00

- Changing the initialization values of the control file  
Use the following procedure to call the file.

B > EDLIN SVC.CTL

\* L

```

1 : == Control File of SVC.EXE ==
2 : Host ID (0-7)
3 : 7 .....①
4 : Target ID (0-7)
5 : 0 .....②
6 : LUN (0-3)
7 : 0 .....③
8 : NOB (1-80(HEX))
9 : 80 .....④
10 : Output File Name (0:" SVCE.LOG ",
      1:" (Start Time).LOG ")
11 : 0 .....⑤

```

- ①: Sets host SCSI ID = 7
- ②: Sets target SCSI ID = 0
- ③: Sets LUN (Logical Unit Number) = 0
- ④: Sets NOB (Number Of Blocks) = 80 (Hex) for number of blocks to be read. (This value is valid when Butterfly and Constant Aging.)
- ⑤: Selects of filename for output of test results 0 = "SVCE.LOG" (fixed filename) 1 = ".LOG" (.LOG appended to test start time)

Example:

"03081008.LOG"..... March 8, 10:08 AM

Perform as follows to make changes:

Example:

Set Target ID to "5".

- (1) \*5 ..... Change 5th line of file
- (2) 5:\*5 ..... Target ID set to 5
- (3) \*E ..... Quit Editor program

#### 2. Optical disk for testing

Prepare an optical disk to perform the Write Test.

### 6.3 Test Items

The test is performed according to the following steps.

#### Step 1. Controller Diagnostics

- Issues INQUIRY command
- Performs self-diagnostics using SEND DIAGNOSTIC command

#### Step 2. Media Condition

- Issues TEST UNIT READY command
- Issues READ CAPACITY command (data check not performed)
- Issues MODE SENSE command (checks cartridge write protected or not)

#### Step 3. Media Initialization

- Initializes MODE SELECT parameter
- Issues START/STOP UNIT command to spin up the disk ( for only Seek Test )
- Issues FORMAT UNIT command and clear of alternate data (for only Rewritable Write and Read Test)
- Issues VERIFY command to find an empty area for Write Test (for only WORM Write and Read Test)

#### Step 4. Aging Test

##### Menu 1: Seek Test [Butterfly]

Reads the specified number of blocks alternating between the inner tracks and outer tracks and proceeds toward the mid-tracks with the READ (Extended, ECC OFF) command. When the optical head reaches to mid-tracks, access is performed again beginning from the inner tracks and outer tracks (see Figure 1). Data checking and error correction are not performed, only the Seek Test is performed.

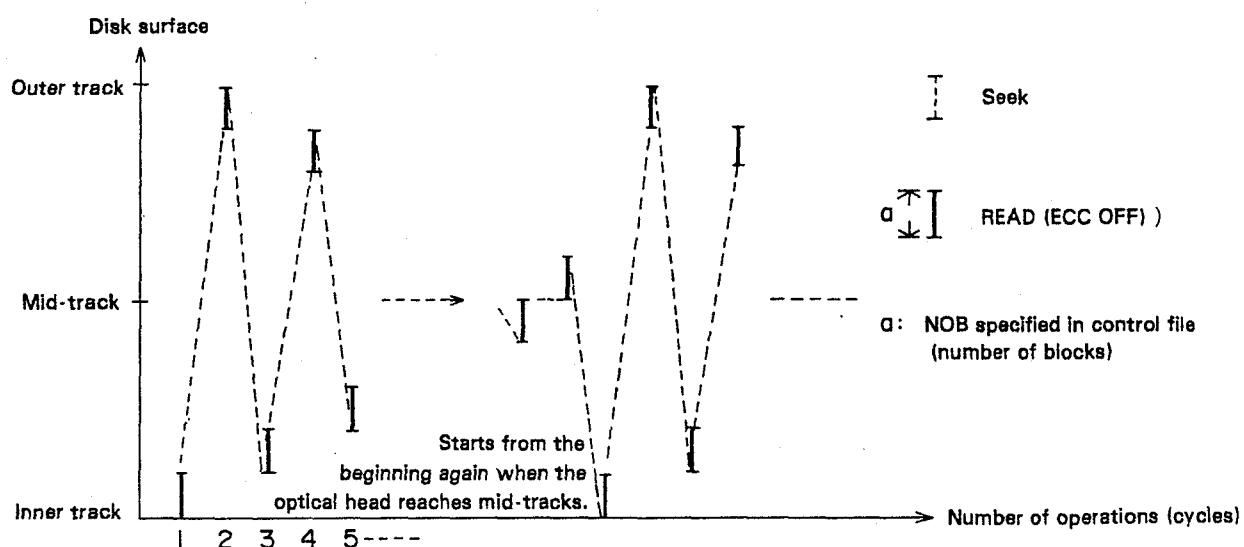


Figure 1

**Menu 2: Seek Test [Random]**

Reads a random number of blocks beginning from a random logical block address with the READ (Extended, ECC OFF) command (see Figure 2). Data checking and error correction are not performed, only the Seek Test is performed.

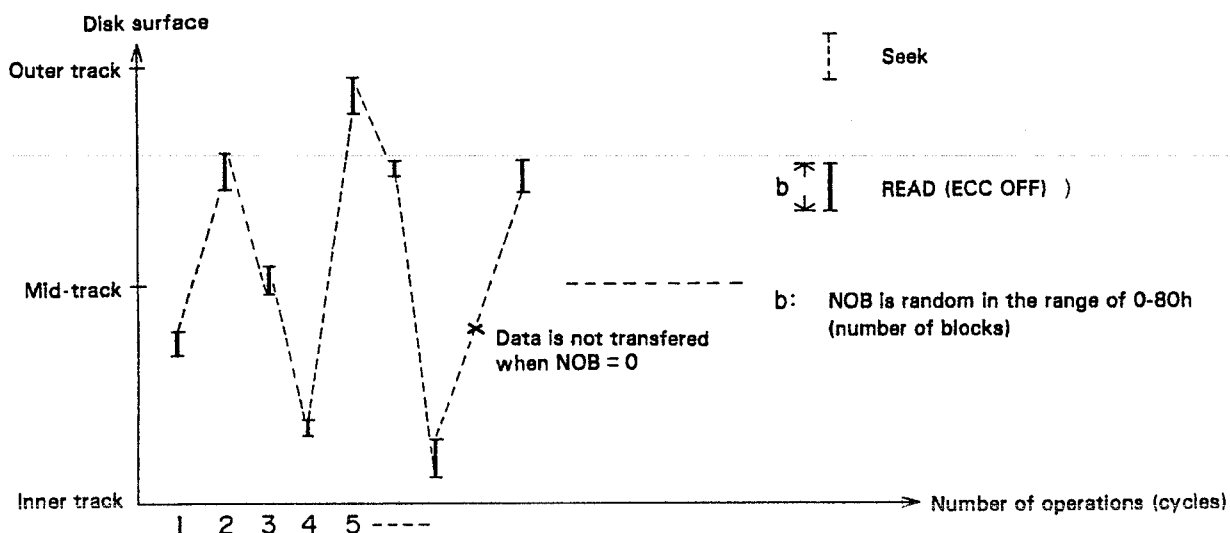


Figure 2

**Menu 3: Seek Test [Constant]**

Reads the specified number of blocks beginning from the two specified logical block addresses, by alternating between these two specified logical block addresses with the READ (Extended, ECC OFF) command (see Figure 3). Data checking and error correction are not performed, only the Seek Test is performed.

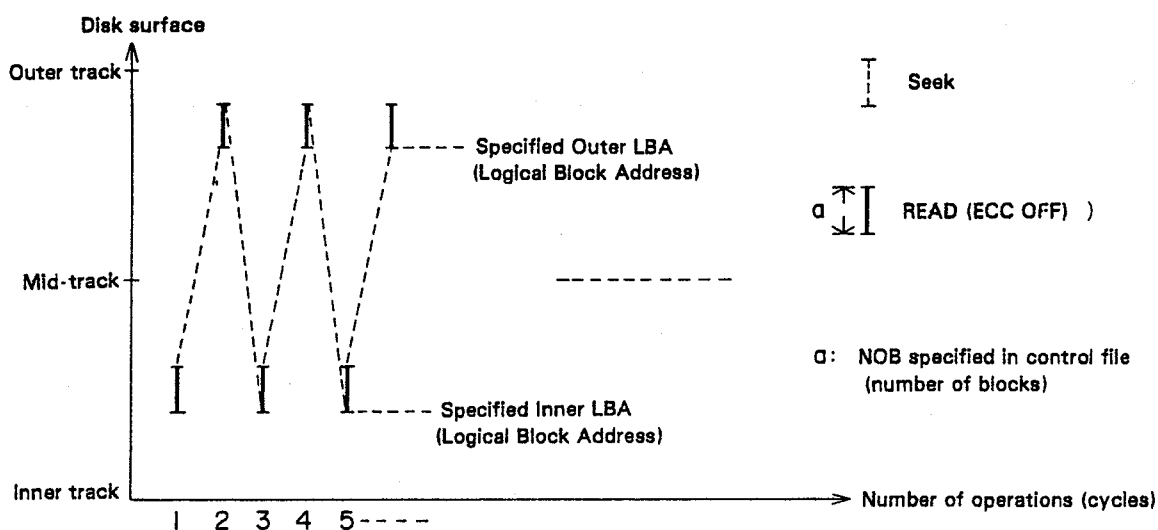


Figure 3

**Menu 4: Write and Read Test [Butterfly]**

There are two kinds of appropriate operations according to media type, Rewritable and WORM.

**(1) Rewritable**

Writes the specified number of blocks beginning from the inner tracks and outer tracks and proceeds toward the mid-track, by alternating between the inner tracks and outer tracks with the WRITE (Extended) command. Each time a WRITE command is completed, the area written is read using a READ (Extended, ECC ON) command. The data read is checked by the host computer. If the optical head reaches mid-track, access begins again from the inner tracks and outer tracks (see Figure 4).

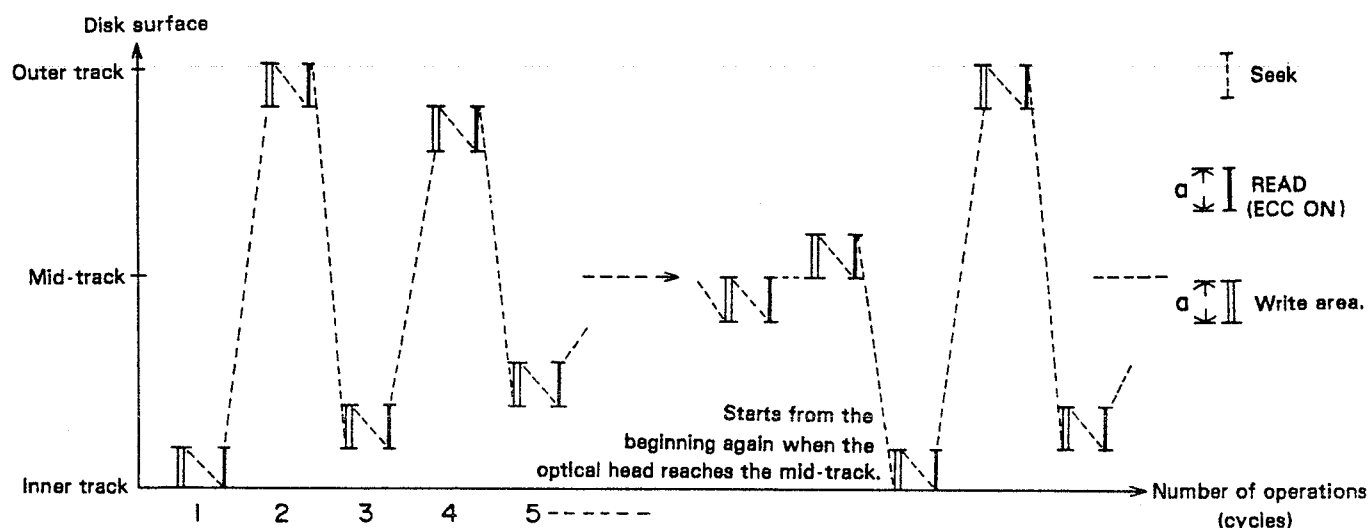


Figure 4

**(2) WORM**

Writes the specified number of blocks alternating between the inner tracks and outer tracks and proceeds toward the mid-track which are blank, with the WRITE (Extended) command. Each time a WRITE command is completed, the area written is read using a READ (Extended, ECC ON) command. The data read is checked by the host computer. If the blank area is exhausted, the sequence ends (see Figure 5).

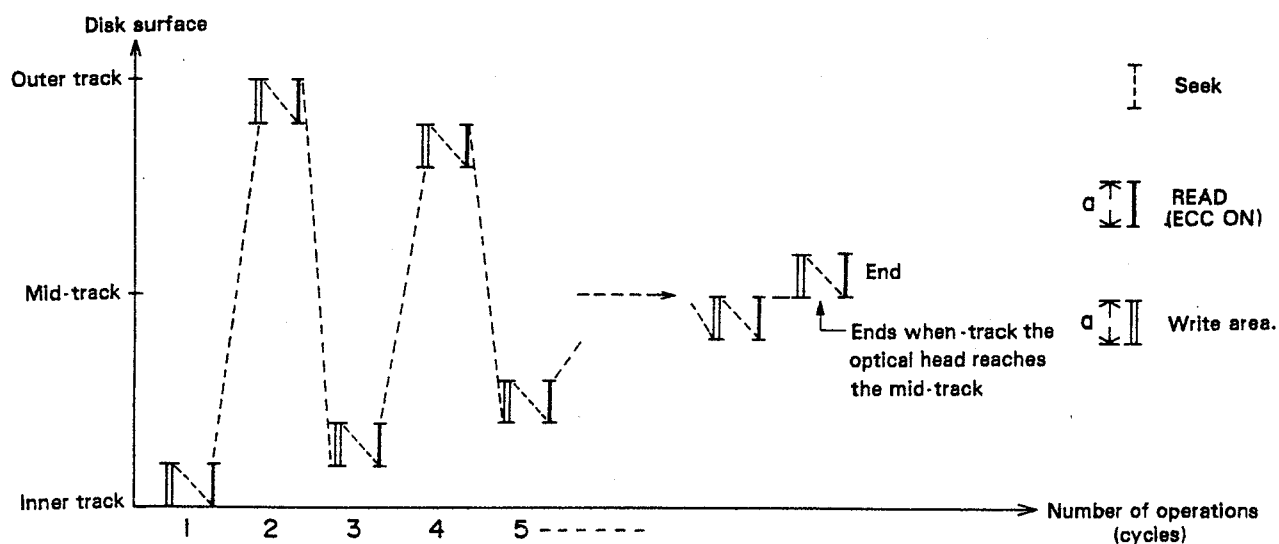


Figure 5

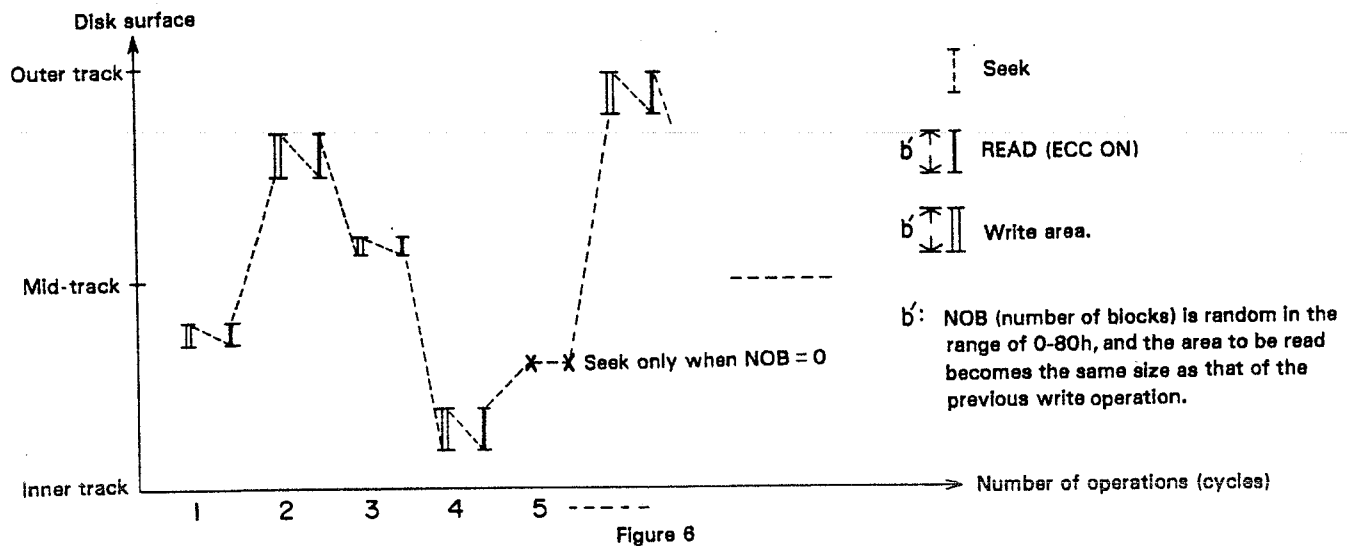
**Note:** For WORM, writing begins from the inner tracks and outer tracks which are blank.

### Menu 5: Write and Read Test [Random]

There are two kinds of appropriate operations according to media type, Rewritable and WORM.

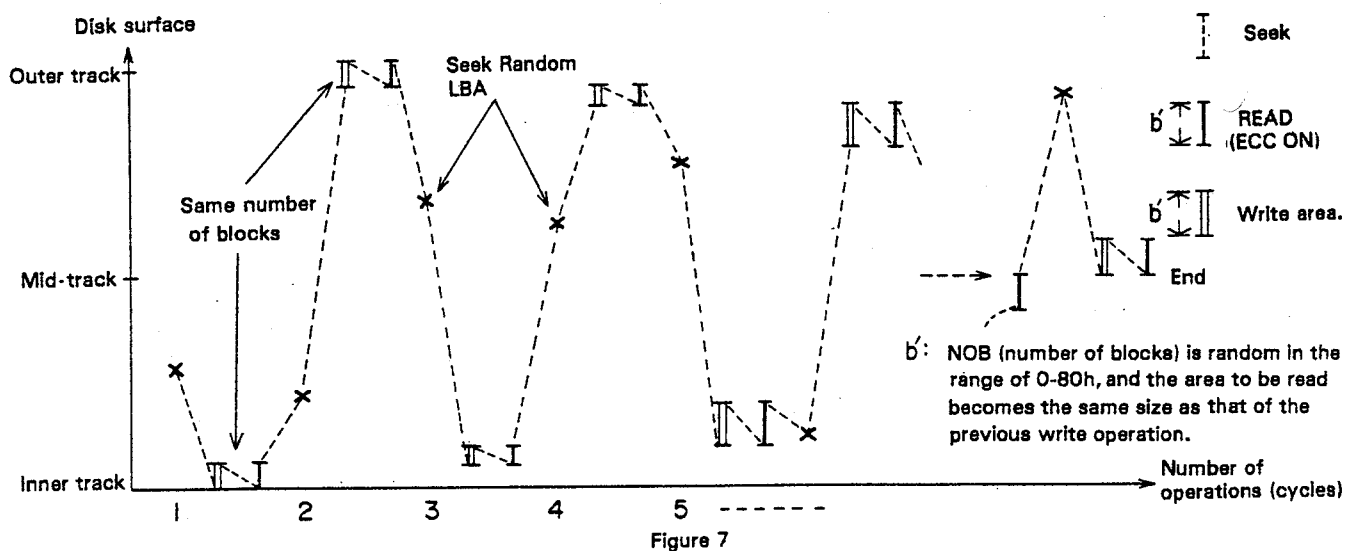
#### (1) Rewritable

Writes a random number of blocks beginning from a random logical block address with the WRITE (Extended) command. Each time a WRITE command is completed, the area written is read using a READ (Extended, ECC ON) command. The data read is checked by the host computer (see Figure 6).



#### (2) WORM

Seeks to a random logical block address with the SEEK (Extended) command. After that, a random number of blocks are written by alternating from the inner tracks and the outer tracks and proceeding toward the mid-track which are blank, using a WRITE (Extended) command. The number of blocks for the inner tracks and the corresponding outer tracks are the same. Each time a WRITE command is completed, the area written is read using a READ (Extended, ECC ON) command. The data read is checked by the host computer. If the blank area is exhausted, the sequence ends (see Figure 7).



Note: For WORM, writing begins from the inner tracks and outer tracks which are blank.

A pair of Inner write operation and outer write operation have the same number of blocks in order to spend the same number of blocks proceeding toward the mid-track.



**Menu 6: Write and Read Test [Constant]**

The menu is available for only Rewritable.

Writes the specified number of blocks alternating between the two specified logical block addresses with the WRITE (Extended) command. Each time a WRITE command is completed, the area written is read using a READ (Extended, ECC ON) command. The data read is checked by the host computer. (See Figure 8).

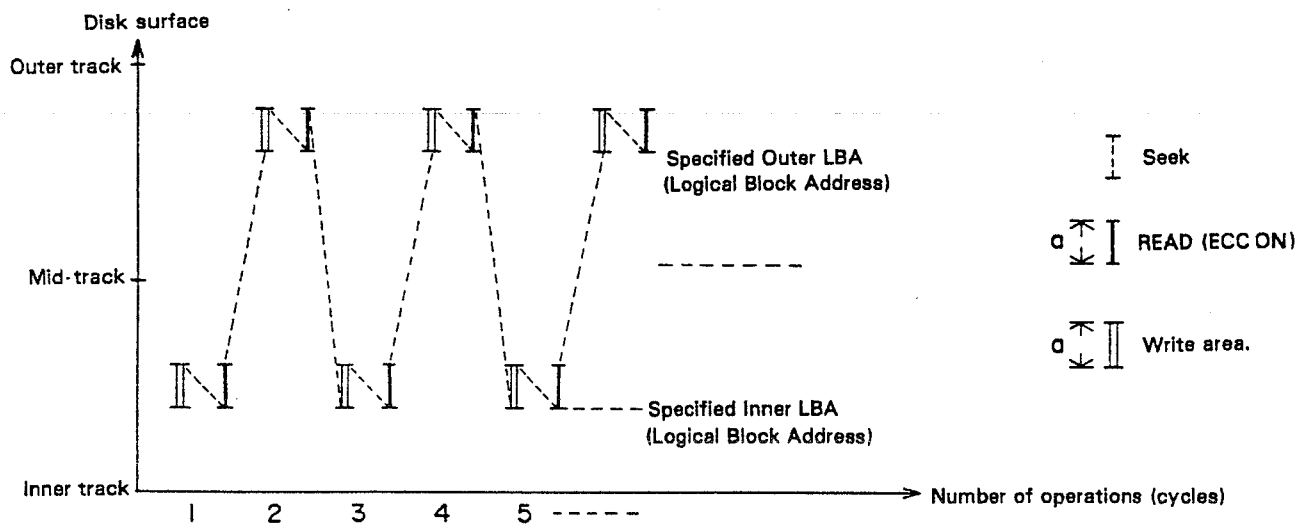


Figure 8

Note: This menu is available only in the Rewritable Mode.

## 6.4 Testing Flow

1) The test is performed in accordance with the following flowchart.

### 1. Test execution

\*1:

Menu 1: Seek Test (Read without ECC)

[Butterfly]

Menu 2: Seek Test (Read without ECC)

[Random]

Menu 3: Seek Test (Read without ECC)

[Constant]

Menu 4: Write and Read Test [Butterfly]

Menu 5: Write and Read Test [Random]

Menu 6: Write and Read Test [Constant]

\*2: Input LBA (logical block address) in hexadecimal and push ENTER key. There are both inner and outer addresses, so their magnitude is not particularly important.

\*3: Input number of executions for aging test.

\*4: The test is interrupted if the number specified here is exceeded.

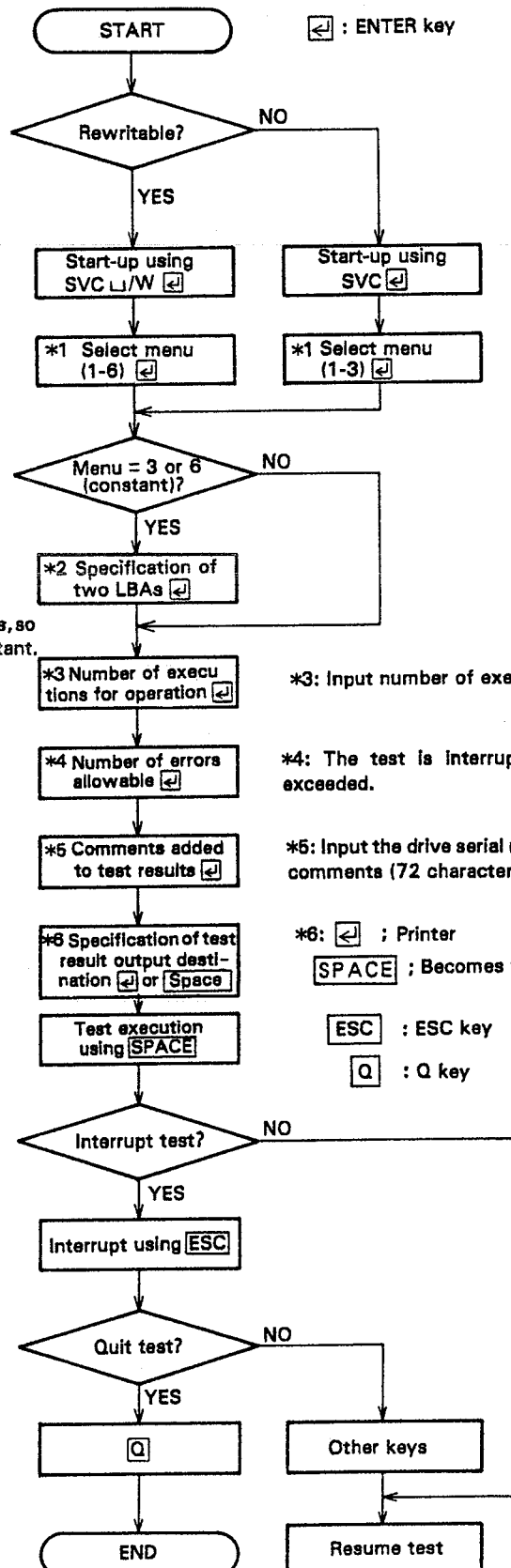
\*5: Input the drive serial number and optical disk serial number as comments (72 characters or less)

\*6: ☐ ; Printer

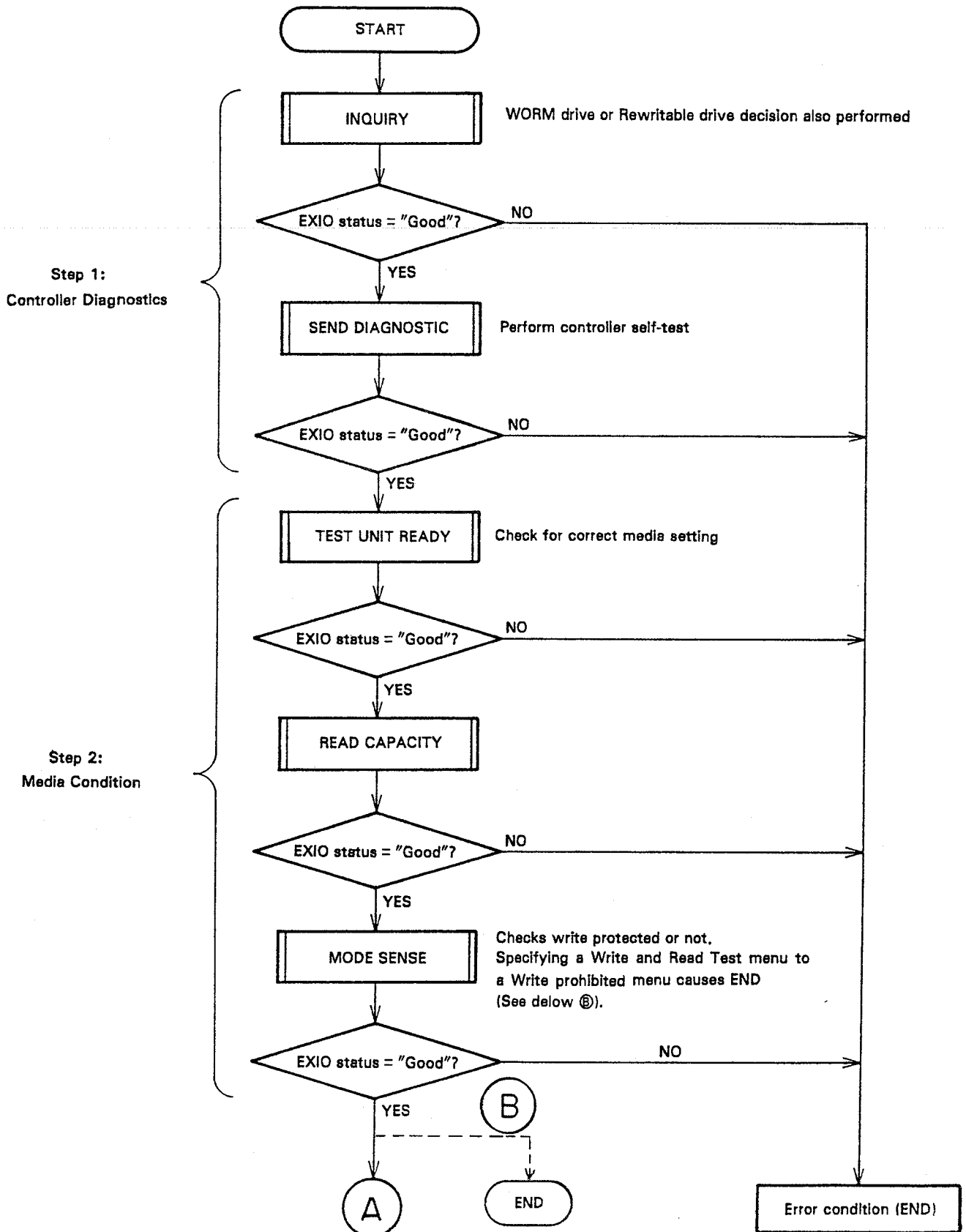
☐ SPACE ; Becomes file of current drive

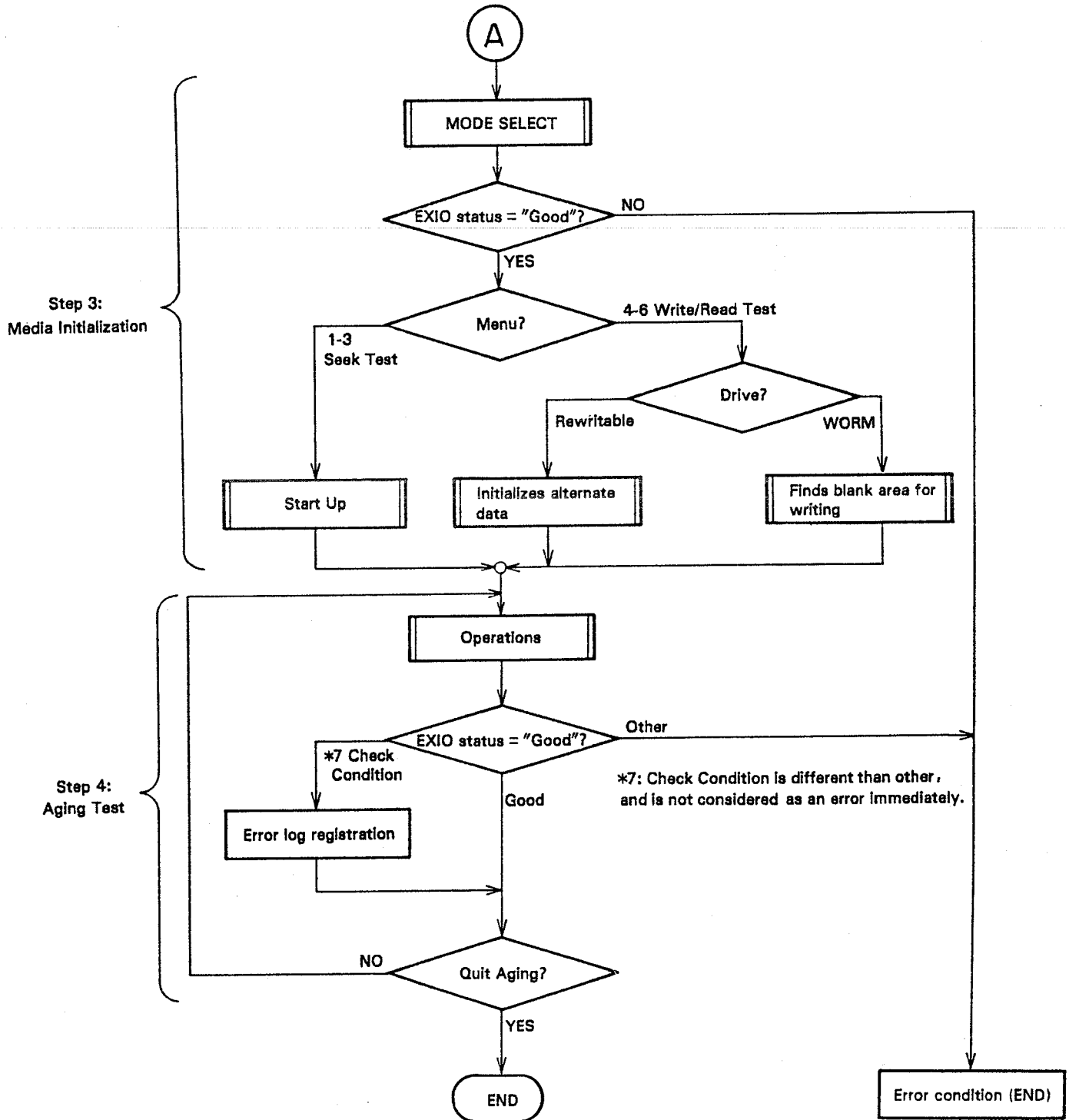
☐ ESC : ESC key

☐ Q : Q key



## 2. Test steps





- 2) Display messages  
6th line of displayed message

**"Press [Q] to quit, press other key to continue."**

Press [ESC] key during execution to display the above message.

Press [Q] to quit the test. Press any other key to continue.

Pressing [Q] causes "Interrupted by user" to appear momentarily.

**"Write operation cannot execute, because write protect tab is set."**

The Write and Read Test cannot execute because the write protect tab of the cartridge is set to prohibit write. Press any key to quit the program.

**"Complete ..... Press any key."**

Indicates that the specified number of operations have been completed. Press any key to quit the program.

**"Fatal Error ..... Press any key."**

If the EXIO status was not "Good" in steps 1-3, or the EXIO status in step 4 was "Good" or these were neither "Check Condition", the test is interrupted and this display appears. Press any key to quit the program.

**"Total error count exceeded designated limit. Press any key."**

Indicates that the number of allowable errors specified in the Aging Test was exceeded. Press any key to skip the program.

**"This WORM disk has no space for write test. Press any key."**

This display appears if a Write and Read test was performed using a WORM disk and the empty area was filled during the test write. Change to a new disk if this occurs. Press any key to skip the program.

**"Cannot write [Const], because this medium is WORM. Press any key."**

Displayed if a Write and Read test [Constant] operation is specified for a WORM disk. Press any key to skip the program.

- 3) Reading the test screen

Test results are displayed at each step of the test.

#### Command Descriptions

- ①. Command: Displays SCSI command to be executed (blue during execution)
- ②. LBA: Logical block address for READ, WRITE, or SEEK command
- ③. NOB: Number of blocks for READ or WRITE, or VERIFY command
- ④. Distance: Standard movement distance of track when a seek operation included in a READ, WRITE, or SEEK command is executed
- ⑤. Time: Command execution time, a Warning occurs for a Read or Write of more than 3 seconds
- ⑥. STS: EXIO status
- ⑦. SNS: Sense key
- ⑧. ASC: Additional sense code
- ⑨. INF: Information Bytes (logical block address where error occurred)
- ⑩. TFR: Number of bytes actually transferred
- ⑪. VFY: Data check result (OK/NG)
- ⑫. Total: Specified number of repeats for aging
- ⑬. Current: Current number of executions
- ⑭. Remaining Time: Time remaining until aging complete
- ⑮. EXIO status display
- ⑯. Sense key display when error (displayed only when error)
- ⑰. Additional sense code when error (displayed only when error)

**STEP 1: Controller Diagnostics**

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
Command	LBA	NOB	Distance	Time	STS	SNS	ASC	INF	TFR	VFY
INQUIRY					0000					
	H	H	D	D	H	H	H	H	H	D
S-DIAG										
	H	H	D	D	H	H	H	H	H	D
	H	H	D	D	H	H	H	H	H	D

- ⑮ → STS [0000] : Good  
 ⑯ → SNS  
 ⑰ → ASC

**STEP 2: Media Condition**

Command	LBA	NOB	Distance	Time	STS	SNS	ASC	INF	TFR	VFY
TU READY					0000					
	H	H	D	D	H	H	H	H	H	D
READ CAP					0000					
	H	H	D	D	H	H	H	H	H	D
MODE SNS					0000					
	H	H	D	D	H	H	H	H	H	D

STS [0000] : Good

**STEP 3: Media Initialization**

Command	LBA	NOB	Distance	Time	STS	SNS	ASC	INF	TFR	VFY
MODE SEL					0000					
	H	H	D	D	H	H	H	H	H	D
FMT UNIT										
	H	H	D	D	H	H	H	H	H	D
	H	H	D	D	H	H	H	H	H	D

STS [0000] : Good

**STEP 4: Aging Test**

- ⑫ → Total 200 cycle  
 ⑬ → Current 107 cycle  
 ⑭ → Remaining Time 2 min

Command	LBA	NOB	Distance	Time	STS	SNS	ASC	INF	TFR	VFY
WRITE	47604	73	-7506tr	0 s	0000				E600	
	H	H	D	D	H	H	H	H	H	D
READ	47604	73	-3tr	1 s	0000				E600	OK
	H	H	D	D	H	H	H	H	H	D
	H	H	D	D	H	H	H	H	H	D

STS [0000] : Good

#### 4) EXIO status and sense data

##### 1. EXIO status

Number enclosed in parentheses indicates error code.

##### •GOOD (0000h)

Indicates that command ended normally.

##### •CHECK CONDITION (0002h)

Indicates that items that should be reported to the initiator occurred at the time of command execution. The detail references the sense key and additional sense code because this test software automatically issues a REQUEST SENSE command. (However, the sense key is not displayed because there is no error if a sense key BLANK CHECK is caused by the Check Condition during search for an blank area of WORM.)

##### •BUSY (0008h)

Indicates that specified target is in a Busy condition. If a Busy is returned by the test software, the command is automatically reissued. This display is shown if the Busy condition still exists after 7,000 retries.

##### •RESERVATION CONFLICT (0018h)

Indicates that the specified target is reserved by another initiator. This does not normally occur with this software.

##### •CANNOT GET SCSI BUS (0100h)

Indicates that authority to use the SCSI bus could not be obtained in the arbitration phase. This does not normally occur with this software.

##### •NOT BUS FREE (0101h)

Indicates that SCSI bus is in use. If a Not Bus Free is returned by the test software, the command is automatically reissued. This display is shown if the Not Bus Free condition still exists after 7,000 retries.

##### •SELECTION TIMEOUT (0102h)

Specified target is not connected or no response.

##### •RESET CONDITION OCCURRED (0103h)

Reset occurred during command execution.

##### •INVALID COMMAND (1000h)

Command code or parameter specification is incorrect. This does not normally occur with this software.

##### •SPC DIAGNOSTIC ERROR (8010h)

Error occurred during SPC initialize, or I/O address set value on card and set value during software test disagree.

##### •SPC PARITY ERROR (5001h)

Parity error occurred during data output to SCSI bus.

##### •SCSI PARITY ERROR (5003h)

Parity error occurred during data input from SCSI bus.

##### •SPC ERROR (8000h)

Abnormal SPC internal interrupt occurred.

##### •INVALID PHASE CHANGE (8100h)

An unexpected phase change occurs in the middle of a phase.

##### •TIMEOUT OR PHASE ERROR (8200h)

Did not proceed to next phase within the required time after completion of a phase, or shifted to an unexpected phase.

##### •MESSAGE CODE ERROR (8301h)

Undefined message code returned.

##### •PHASE NOT COMPLETE (8306h)

Does not proceed to Bus Free after command complete.

#### 2. Sense data in WORM

Number enclosed in parentheses indicates sense key/additional sense code.

##### NO SENSE / NO ADDITIONAL SENSE INFORMATION (00h/00h)

Indicates that there is no information to be reported to the initiator. This would be the case for a successful command.

##### RECOVERED ERROR / NO ADDITIONAL SENSE INFORMATION (01h/00h)

Indicates that the last READ command completed successfully with retry action by the target. This condition is not considered as an error. The logical block address of the last recovered block is reported in the information bytes of the sense data.

##### NOT READY / DRIVE NOT READY (Off Line) (02h/04h)

Indicates that the specified logical unit does not exist.

##### NOT READY / MEDIUM NOT PRESENT (02h/80h)

Indicates that no medium has been inserted in the logical unit.

**NOT READY / MODE MISMATCHED (02h /83h)**

Indicates that a Rewritable medium is inserted in the logical unit. The initiator may be able to access the medium after issuing the CHANGE MODE command.

**MEDIUM ERROR / WRITE FAULT (03h/03h)**

Indicates that a write operation is not completed by the medium defects or by the hardware error of the drive. The logical block address of the first block of which data is not written successfully is reported in the information bytes of the sense data.

**MEDIUM ERROR / DEFECTIVE RECORDED BLOCK OR BLANK BLOCK ENCOUNTERED (03h/11h)**

Indicates that the defective recorded block or the blank block was encountered during a read operation. The logical block address of the first block which data is not read successfully is reported in the information bytes of the sense data.

**MEDIUM ERROR / NO DEFECT SPARE LOCATION AVAILABLE (03h/32h)**

Indicates that the alternative area for the specified logical blocks on the medium has been exhausted and the write operation was terminated. The logical block address of the first block which data is not written successfully is reported in the information bytes of the sense data.

**HARDWARE ERROR / LOGICAL UNIT COMMUNICATION FAILURE (04h/08h)**

Indicates that the last command is terminated by the failure during the communication between the controller and the logical unit.

**HARDWARE ERROR / TRACK FOLLOWING ERROR (04h/09h)**

The drive does not correctly trace the track and the command is interrupted.

**HARDWARE ERROR / RAM FAILURE (04h/40h)**

Indicates that the RAM diagnostic was failed in the SEND DIAGNOSTIC command or during the controller Power ON self-checking.

**HARDWARE ERROR / DATA PATH DIAGNOSTIC FAILURE (04h/41h)**

Indicates that the diagnostics of the error correction and detection circuit were failed in the SEND DIAGNOSTIC command or during the controller Power ON self-checking.

**HARDWARE ERROR / POWER ON DIAGNOSTIC FAILURE (04h/42h)**

Indicates that the sum checking of the controller ROM was failed during the controller Power ON self-checking.

**HARDWARE ERROR / MESSAGE REJECT ERROR (04h/43h)**

Indicates that the command is terminated by the MESSAGE REJECT message sent from the initiator.

**HARDWARE ERROR / INTERNAL CONTROLLER ERROR (04h/44h)**

Indicates that an error is detected during the control of the SCSI interface IC.

**HARDWARE ERROR / INAPPROPRIATE MESSAGE (04h/49h)**

Indicates that the command is terminated by the inappropriate message sent from the initiator.

**HARDWARE ERROR / LOADING MECHANISM FAILURE (04h/91h)**

Indicates that the medium eject operation was failed by a loading mechanism failure.

**HARDWARE ERROR / DISK MOTOR FAILURE (04h/92h)**

Indicates that the rotational speed of the disk motor was not locked.

**HARDWARE ERROR / FOCUSING FAILURE (04h/93h)**

Indicates that the focusing servo was not locked during the medium spinning up sequence or focusing servo was failed.

**HARDWARE ERROR / SYNCHRONIZATION ERROR (04h/94h)**

Indicates that the synchronization error was detected during the following the tracks.

**HARDWARE ERROR / ID CANNOT BE DETECTED (04h/95)**

Indicates that the ID address of the medium could not be detected.

**HARDWARE ERROR / DEFECT MANAGEMENT TRACK NOT EXIST (04h/96h)**

Indicates that the Defect Management Track of the WORM medium has not been recorded.



**HARDWARE ERROR / CONTROL TRACK READ FAILURE (04h/97h)**

Indicates that the control track has not been read by the target because of any hardware failures of the drive or the invalid medium is inserted logical unit.

**HARDWARE ERROR / INVALID CODE IS RETURNED FROM THE LOGICAL UNIT (04h/98h)**

Indicates that the inappropriate status was returned from the logical unit.

**ILLEGAL REQUEST / INVALID OPERATION CODE (05h/20h)**

Indicates that the invalid SCSI command which is not implemented or which is in inappropriate use is issued by the initiator.

**ILLEGAL REQUEST / ILLEGAL LOGICAL BLOCK ADDRESS (05h/21h)**

Indicates that the logical block address specified in CDB is out of the medium capacity. The information bytes of the sense data always indicate the first logical block address which exceeds the user capacity (the last logical block address of the medium plus one).

**ILLEGAL REQUEST / ILLEGAL FIELD IN CDB (05h/24h)**

Indicates that the invalid codes or bits are set in CDB.

**ILLEGAL REQUEST / INVALID LUN (05h/25h)**

Indicates that the logical unit number set in CDB is invalid.

**ILLEGAL REQUEST / INVALID FIELD IN PARAMETER LIST (05h/26h)**

Indicates that the invalid codes or bits are set in the parameter list sent by the initiator during the DATA OUT phase.

**ILLEGAL REQUEST / COPY CANNOT EXECUTE SINCE HOST CANNOT DISCONNECT (05h/28h)**

Indicates that the copy operation cannot be performed because the initiator does not have the disconnect capability.

**UNIT ATTENTION / MEDIUM CHANGED (06h/28h)**

Indicates that the medium in the logical unit has been changed.

**UNIT ATTENTION / POWER ON OR RESET OR BUS DEVICE RESET IS OCCURRED (06h/29h)**

Indicates that the power is turned on. It also indicates that the target has been reset by the SCSI bus RST signal is true or by the BUS DEVICE RESET message sent from the initiator.

**UNIT ATTENTION / MODE SELECT PARAMETERS ARE CHANGED (06h/2Ah)**

Indicates that the MODE SELECT parameters have been changed by the MODE SELECT command sent from another initiator.

**UNIT ATTENTION / CONTROLLER MODE IS CHANGED (06h/85h)**

Indicates that the controller mode has been changed by the CHANGE MODE command sent from another initiator.

**DATA PROTECT / WRITE PROTECTED (07h/27h)**

Indicates that the write-protect tab on the cartridge in the logical unit is set to the write-protected.

**DATA PROTECT / COPY CANNOT EXECUTE BECAUSE OF THE RESERVATION (07h/82h)**

Indicates that the copy operation is inhibited because all or a part of the logical blocks specified in the COPY command are reserved by another initiator.

**BLANK CHECK / NO ADDITIONAL SENSE INFORMATION (08h/00h)**

Indicates that the target encountered a nonblank block while blank checking of a VERIFY command (the BlkVfy bit is set to one), or while blank checking of a write operation (the EBC bit in the MODE SELECT parameter is set to one).

When the RDBC bit in the MODE SELECT parameter is set to one, it also indicates that a blank block was found during a read operation.

**ABORTED COMMAND / SCSI INTERFACE PARITY ERROR (08h/47h)**

Indicates that the target detects the parity error and aborts the command after a retry attempt.

**ABORTED COMMAND / INITIATOR DETECTED ERROR (08h/48h)**

Indicates that the target receives the INITIATOR DETECTED ERROR message from the initiator and aborts the command after a retry attempt.

**3. Sense data in Rewritable**

Number enclosed in parentheses indicates sense key/additional sense code.

**NO SENSE / NO ADDITIONAL SENSE INFORMATION (00h/00h)**

Indicates that there is no information to be reported to the initiator. This would be the case for a successful command.

**RECOVERED ERROR / NO ADDITIONAL SENSE INFORMATION (01h/00h)**

Indicates that the last READ command completed successfully with retry action by the target. This condition is not considered as an error. The logical block address of the last recovered block is reported in the information bytes of the sense data.

**NOT READY / DRIVE NOT READY (Off Line) (02h/04h)**

Indicates that the specified logical unit does not exist.

**NOT READY / MEDIUM NOT PRESENT (02h/80h)**

Indicates that no medium has been inserted in the logical unit.

**NOT READY / MODE MISMATCHED (02h/83h)**

Indicates that a WORM medium is inserted in the logical unit. The initiator may be able to access the medium after issuing the CHANGE MODE command.

**MEDIUM ERROR / WRITE FAULT (03h/03h)**

Indicates that a write operation is not completed by the medium defects or by the hardware error of the drive. The logical block address of the first block which data is not written successfully is reported in the information bytes of the sense data.

**MEDIUM ERROR / DEFECTIVE RECORDED BLOCK OR ERASED BLOCK ENCOUNTERED (03h/11h)**

Indicates that the defective recorded block or the erased block was encountered during a read operation. The logical block address of the first block which data is not read successfully is reported in the information bytes of the sense data.

**MEDIUM ERROR / MEDIUM FORMAT CORRUPTED (03h/31h)**

Indicates that the invalid medium is inserted in the logical unit.

**MEDIUM ERROR / NO DEFECT SPARE LOCATION AVAILABLE (03h/32h)**

Indicates that the alternative area for the specified logical blocks on the medium has been exhausted and the write operation was terminated. The logical block address of the first block which data is not written successfully is reported in the information bytes of the sense data.

**MEDIUM ERROR / UNFORMATTED MEDIUM (03h/84h)**

Indicates that the Defect Management Track of the rewritable medium in the logical unit has not been recorded and a medium access operation is disabled. The initiator may be able to request the target to record the defect management information to the Defect Management Track by issuing the FORMAT UNIT command.

**HARDWARE ERROR / LOGICAL UNIT COMMUNICATION FAILURE (04h/08h)**

Indicates that the last command is terminated by the failure during the communication between the controller and the logical unit.

**HARDWARE ERROR / TRACK FOLLOWING ERROR (04h/09h)**

The drive does not correctly trace the track and the command is interrupted.

**HARDWARE ERROR / RAM FAILURE (04h/40h)**

Indicates that the RAM diagnostic was failed in the SEND DIAGNOSTIC command or during the controller Power ON self-checking.

**HARDWARE ERROR / DATA PATH DIAGNOSTIC FAILURE (04h/41h)**

Indicates that the diagnostics of the error correction and detection circuit were failed in the SEND DIAGNOSTIC command or during the controller Power ON self-checking.

**HARDWARE ERROR / POWER ON DIAGNOSTIC FAILURE (04h/42h)**

Indicates that the sum checking of the controller ROM was failed during the controller Power ON self-checking.

**HARDWARE ERROR / MESSAGE REJECT ERROR (04h/43h)**

Indicates that the command is terminated by the MESSAGE REJECT message sent from the initiator.

**HARDWARE ERROR / INTERNAL CONTROLLER ERROR (04h/44h)**

Indicates that an error is detected during the control of the SCSI interface IC.

**HARDWARE ERROR / INAPPROPRIATE MESSAGE (04h/49h)**

Indicates that the command is terminated by the inappropriate message sent from the initiator.

**HARDWARE ERROR /LOADING MECHANISM FAILURE (04h/91h)**

Indicates that the medium eject operation was failed by a loading mechanism failure.

**HARDWARE ERROR / DISK MOTOR FAILURE (04h/92h)**

Indicates that the rotational speed of the disk motor was not locked.

**HARDWARE ERROR / FOCUSING FAILURE (04h/93h)**

Indicates that the focusing servo was not locked during the medium spinning up sequence or focusing servo was failed.

**HARDWARE ERROR / SYNCHRONIZATION ERROR (04h/94h)**

Indicates that the synchronization error was detected during the following the tracks.

**HARDWARE ERROR / ID CANNOT BE DETECTED (04h/95h)**

Indicates that the ID address of the medium could not be detected.

**HARDWARE ERROR / CONTROL TRACK READ FAILURE (04h/97h)**

Indicates that the control track has not been read by the target because of any hardware failures of the drive.

**HARDWARE ERROR / INVALID CODE IS RETURNED FROM THE LOGICAL UNIT (04h/98h)**

Indicates that the inappropriate status was returned from the logical unit.

**ILLEGAL REQUEST / INVALID OPERATION CODE (05h/20h)**

Indicates that the invalid SCSI command which is not implemented or which is in inappropriate use is issued by the initiator.

**ILLEGAL REQUEST / ILLEGAL LOGICAL BLOCK ADDRESS (05h/21h)**

Indicates that the logical block address specified in CDB is out of the medium capacity. The information bytes of the sense data always indicate the first logical block address which exceeds the user capacity (the last logical block address of the medium plus one).

**ILLEGAL REQUEST / ILLEGAL FIELD IN CDB (05h/24h)**

Indicates that the invalid codes or bits are set in CDB.

**ILLEGAL REQUEST / INVALID LUN (05h/25h)**

Indicates that the logical unit number set in CDB is invalid.

**ILLEGAL REQUEST / INVALID FIELD IN PARAMETER LIST (05h/26h)**

Indicates that the invalid codes or bits are set in the parameter list sent by the initiator during the DATA OUT phase.

**ILLEGAL REQUEST / COPY CANNOT EXECUTE SINCE HOST CANNOT DISCONNECT (05h/28h)**

Indicates that the copy operation cannot be performed because the initiator does not have the disconnect capability.

**UNIT ATTENTION / MEDIUM CHANGED (06h/28h)**

Indicates that the medium in the logical unit has been changed.

**UNIT ATTENTION / POWER ON OR RESET OR BUS DEVICE RESET IS OCCURRED (06h/29h)**

Indicates that the power is turned on. It also indicates that the target has been reset by the SCSI bus RST signal is true or by the BUS DEVICE RESET message sent from the initiator.

**UNIT ATTENTION / MODE SELECT PARAMETERS ARE CHANGED (06h/2Ah)**

Indicates that the MODE SELECT parameters have been changed by the MODE SELECT command sent from another initiator.

**UNIT ATTENTION / CONTROLLER MODE IS CHANGED (06h/85h)**

Indicates that the controller mode has been changed by the CHANGE MODE command sent from another initiator.

**DATA PROTECT / WRITE PROTECTED (07h/27h)**

Indicates that the write-protect tab on the cartridge in the logical unit is set to the write-protected.

**DATA PROTECT / COPY CANNOT EXECUTE BECAUSE OF THE RESERVATION (07h/82h)**

Indicates that the copy operation is inhibited because all or a part of the logical blocks specified in the COPY command are reserved by another initiator.

**ABORTED COMMAND / SCSI INTERFACE PARITY ERROR (08h/47h)**

Indicates that the target detects the parity error and aborts the command after a retry attempt.

**ABORTED COMMAND / INITIATOR DETECTED  
ERROR (0Bh/48h)**

Indicates that the target receives the INITATOR  
DETECTED ERROR message from the initiator and  
aborts the command after a retry attempt.

**6.5 Reading Test Results**

Test results are displayed as shown below.

\*\*\*\*\*Aging Report\*\*\*\*\*

Total 117 cycle 3 min ..... Actual number of cycles executed and total execution time

Total Error Count = 1 ..... Total number of errors

Total Warning Count = 2 ..... Total number of warnings

\*\*\*\*\*

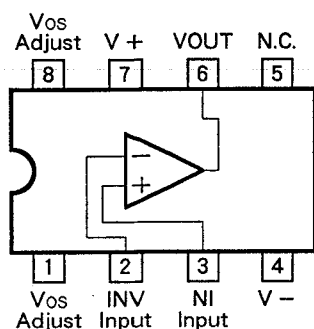
## 7. IC INFORMATION

- The information shown in the list is basic information and may not correspond exactly to that shown in the schematic diagrams.

### ■ LM6364M (IC107)

- High speed operational amplifier

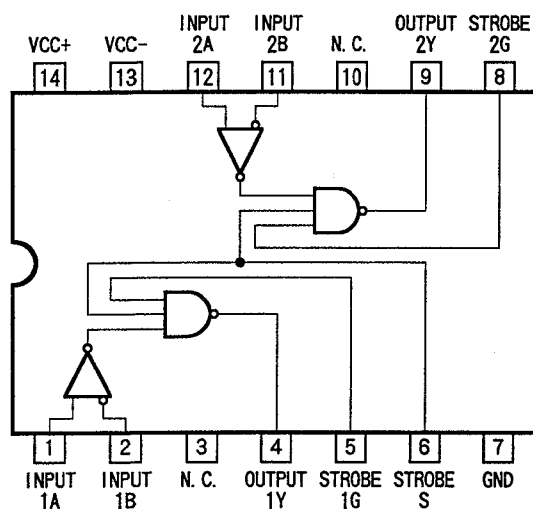
#### ● Block Diagram and Pin Arrangement (Top view)



### ■ SN75108ANS (IC112)

- 2 Circuit line receiver

#### ● Block Diagram and Pin Arrangement (Top view)



#### ● Truth table

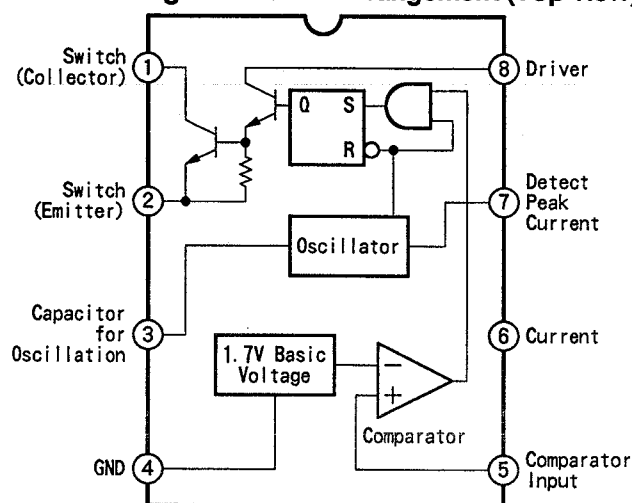
DIFFERENTIAL INPUTS A-B	STROBES		OUTPUT Y
	G	S	
VID > 25mV	X	X	H
- 25mV < VID < 25mV	X	L	H
	L	X	H
	H	H	INDETERMINATE
VID < - 25mV	X	L	H
	L	X	H
	H	H	L

H : high level, L : low level, X : irrelevant

### ■ M5291FP (IC119)

- Switching regulator control

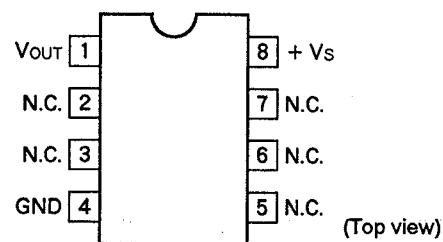
#### ● Block Diagram and Pin Arrangement (Top view)



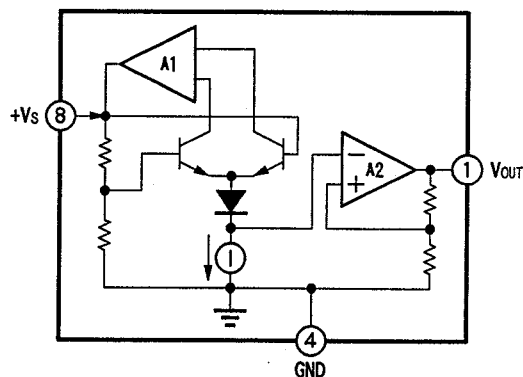
### ■ LM35DM (IC133)

- Precision centigrade temperature sensors

#### ● Pin Arrangement

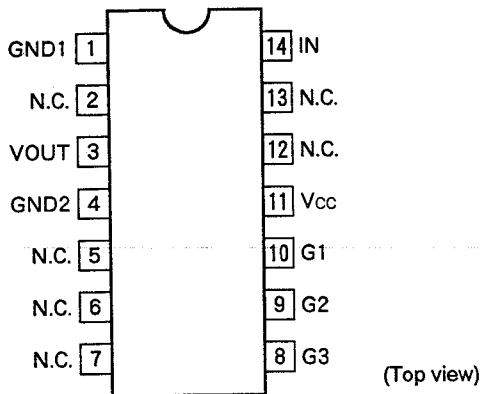


#### ● Block Diagram

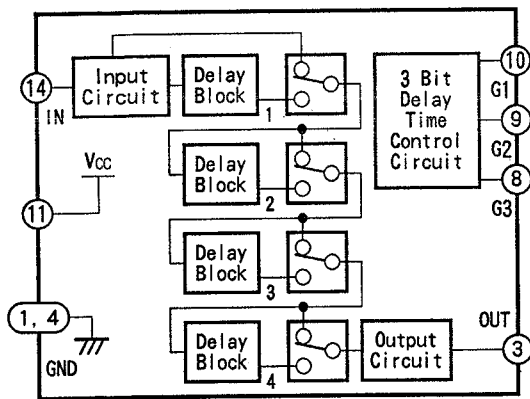


■ **TK16100M (IC123, IC125)**  
• 3 bit control programmable pulse delay line

● Pin Arrangement



● Block Diagram



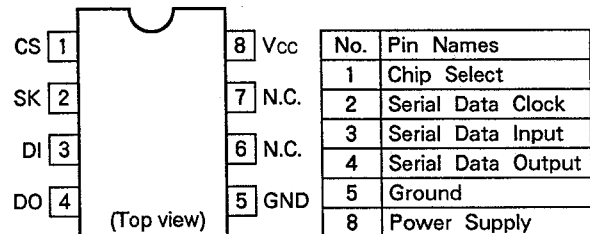
3 Bit Delay Time Control Circuit Input And Delay Time

⑩ G1 INPUT	LOW	OPEN	LOW	OPEN	LOW	OPEN	LOW	OPEN
⑨ G2 INPUT	LOW	LOW	OPEN	OPEN	LOW	LOW	OPEN	OPEN
⑧ G3 INPUT	LOW	LOW	LOW	LOW	OPEN	OPEN	OPEN	OPEN
Td	TPD1	TPD1 +5nS	TPD1 +10nS	TPD1 +15nS	TPD1 +20nS	TPD1 +25nS	TPD1 +30nS	TPD1 +35nS

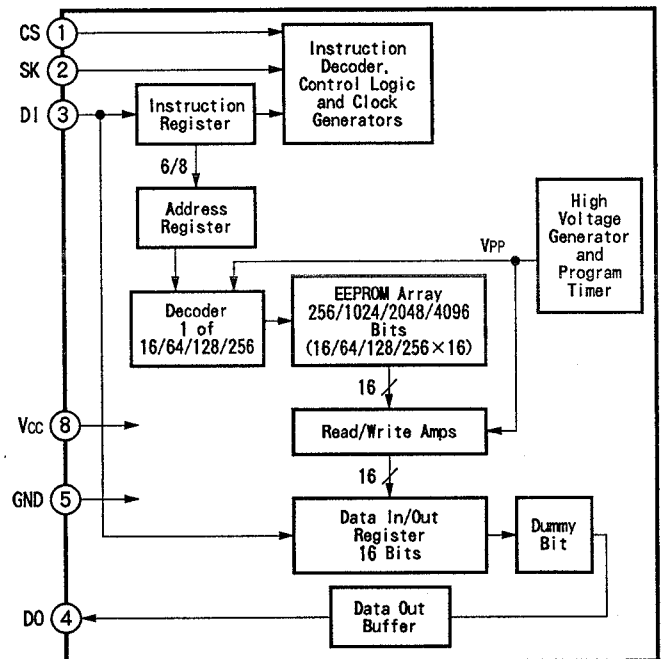
Td : Delay time, TPD1 : First stage delay time

■ **NM93C66EM8 (IC134)**  
• CMOS EEPROM

● Pin Arrangement

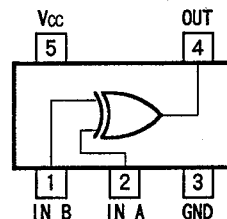


● Block Diagram



■ **TC7S86F (IC142)**  
• Exclusive OR gate

● Block Diagram and Pin Arrangement (Top view)

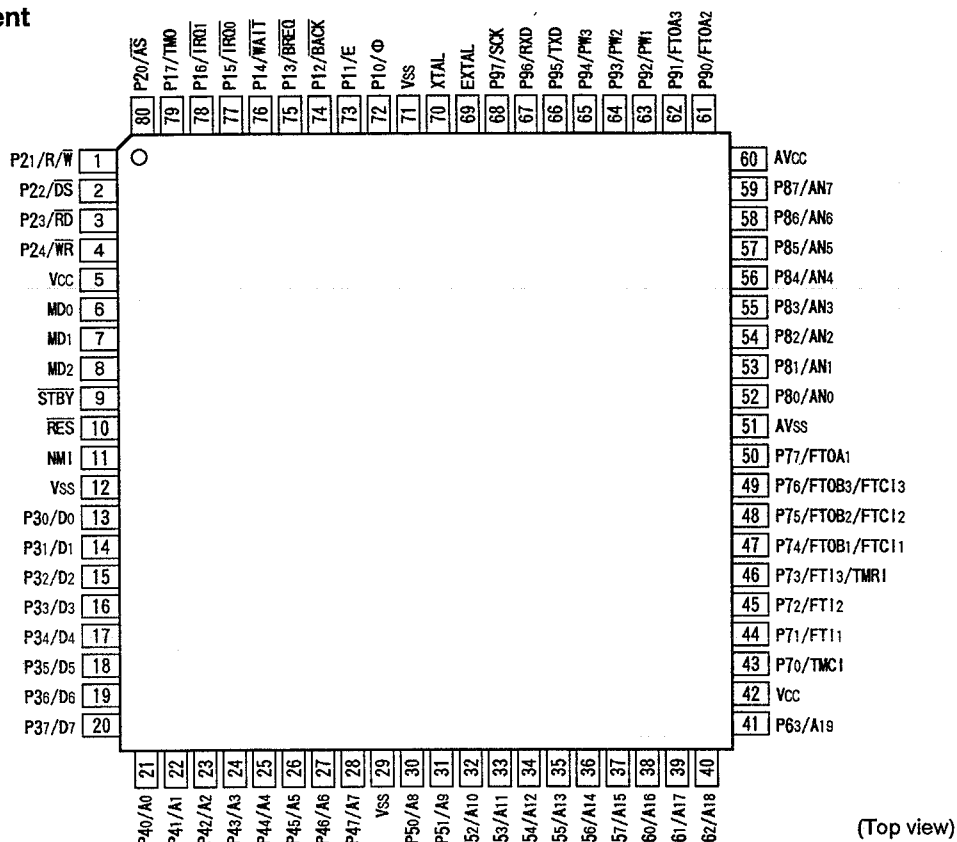


● Truth table

A	B	Y
H	H	L
L	H	H
H	L	H
L	L	L

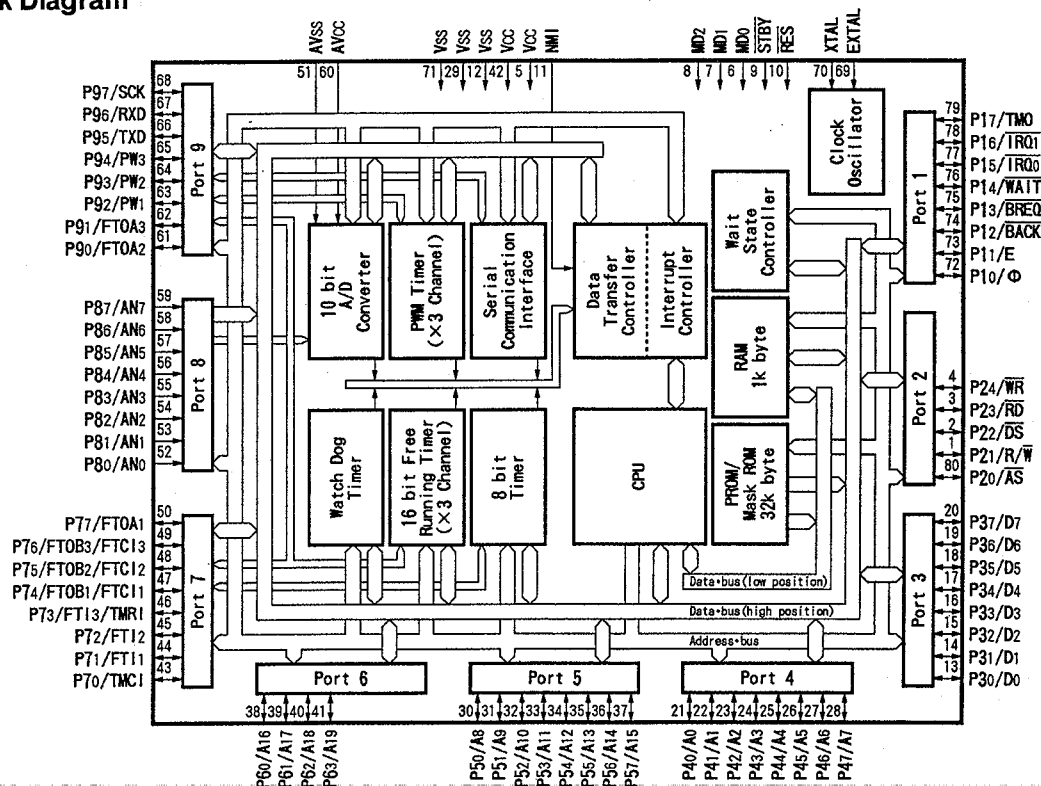
# ■ OYW1068 (IC130) • 8 bit 1 chip microcomputer

## ● Pin Arrangement



(Top view)

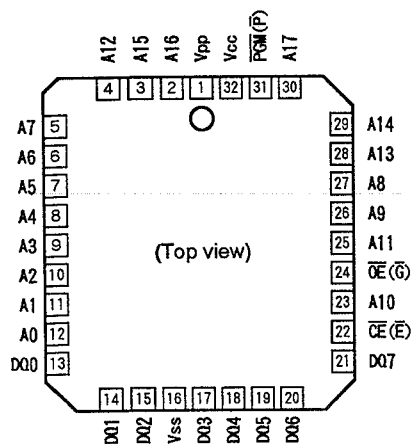
## ● Block Diagram



## ■ OYW1070 (IC308)

• 2 Mbit (262,144 × 8 bit) CMOS EPROM

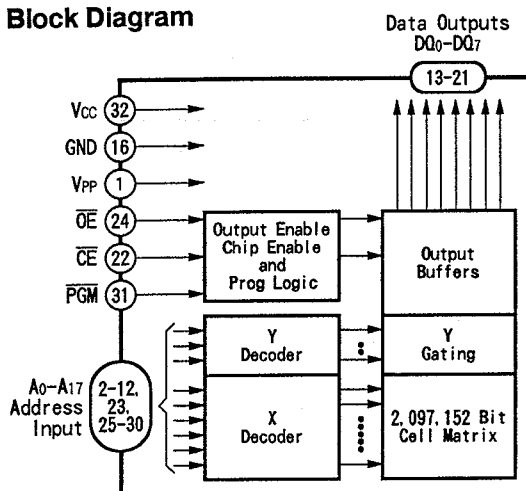
### ● Pin Arrangement



### ● Pin function

No.	Pin name	Function
1	V <sub>PP</sub>	Program Supply Voltage
2-12, 23, 25-30	A <sub>0</sub> -A <sub>17</sub>	Address Input
13-21	DQ <sub>0</sub> -DQ <sub>7</sub>	Data Input/Output
16	GND	Ground
22	CE( $\bar{E}$ )	Chip Enable Input
24	OE( $\bar{G}$ )	Output Enable Input
31	PGM( $\bar{P}$ )	Program Enable Input
32	V <sub>CC</sub>	V <sub>CC</sub> Supply Voltage

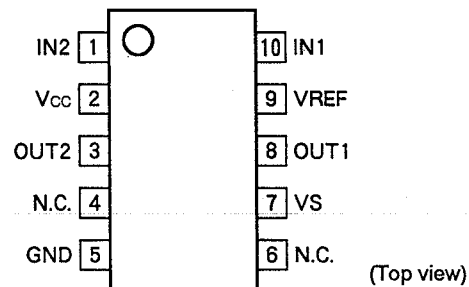
### ● Block Diagram



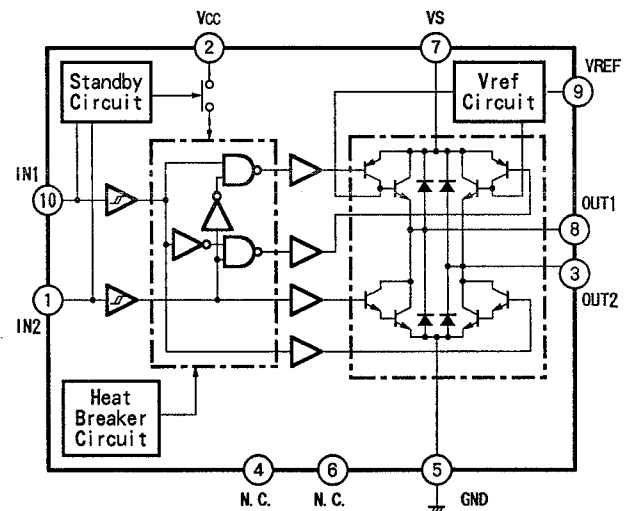
## ■ TA8409F (IC407)

• Bridge driver IC

### ● Pin Arrangement



### ● Block Diagram



### ● Truth table

MODE	INPUT		OUTPUT	
MOTOR	IN1	IN2	OUT1	OUT2
STOP	0	0	∞	∞
CW/CCW	1	0	H	L
CCW/CW	0	1	L	H
BRAKE	1	1	L	L

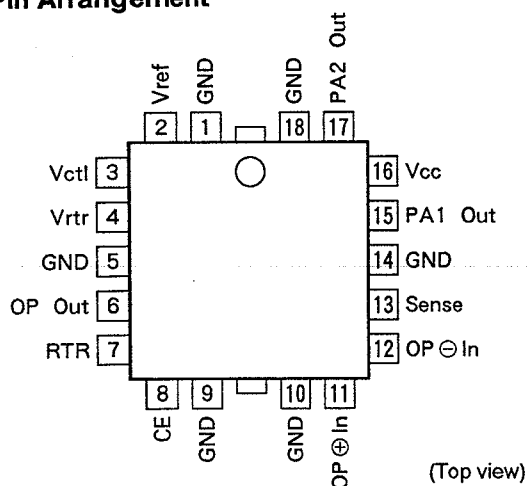
∞ : High impedance  
Note) "H" active is input.



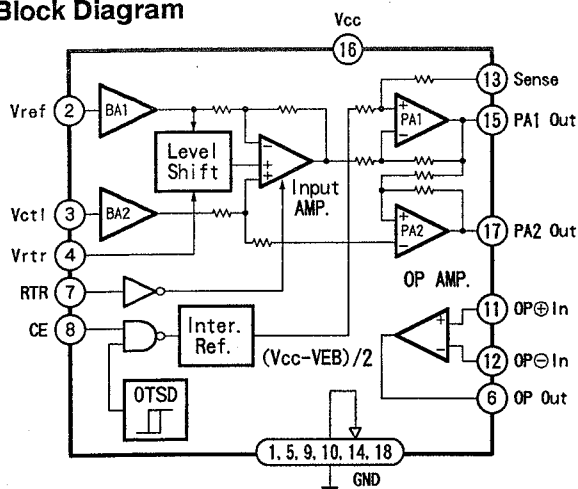
# HA13490MP (IC408, IC409)

• Linear driver

## • Pin Arrangement



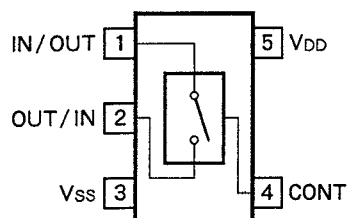
## • Block Diagram



# TC7S66F (IC606)

• Bilateral switch

## • Block Diagram and Pin Arrangement (Top view)



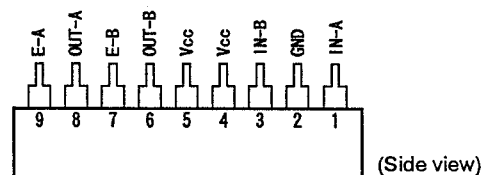
## • Truth table

CONTROL	SWITCH FUNCTION
H	ON
L	OFF

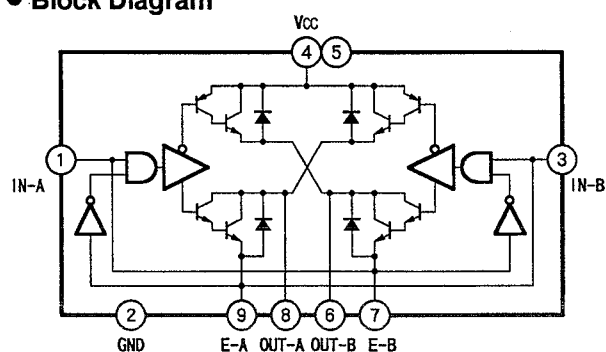
# MB3857PS (IC413)

• Linear motor driver

## • Pin Arrangement



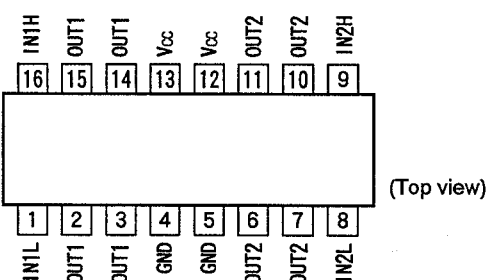
## • Block Diagram



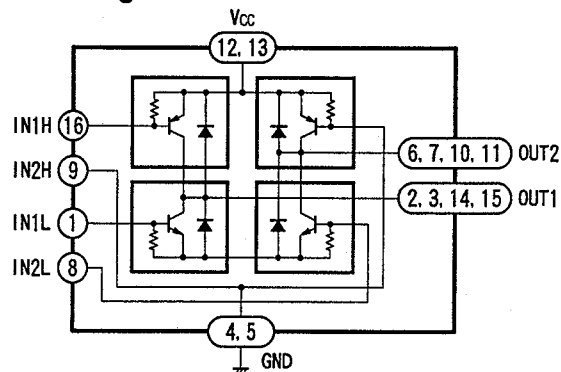
# TD62M4700F (IC418)

• Bridge driver IC

## • Pin Arrangement

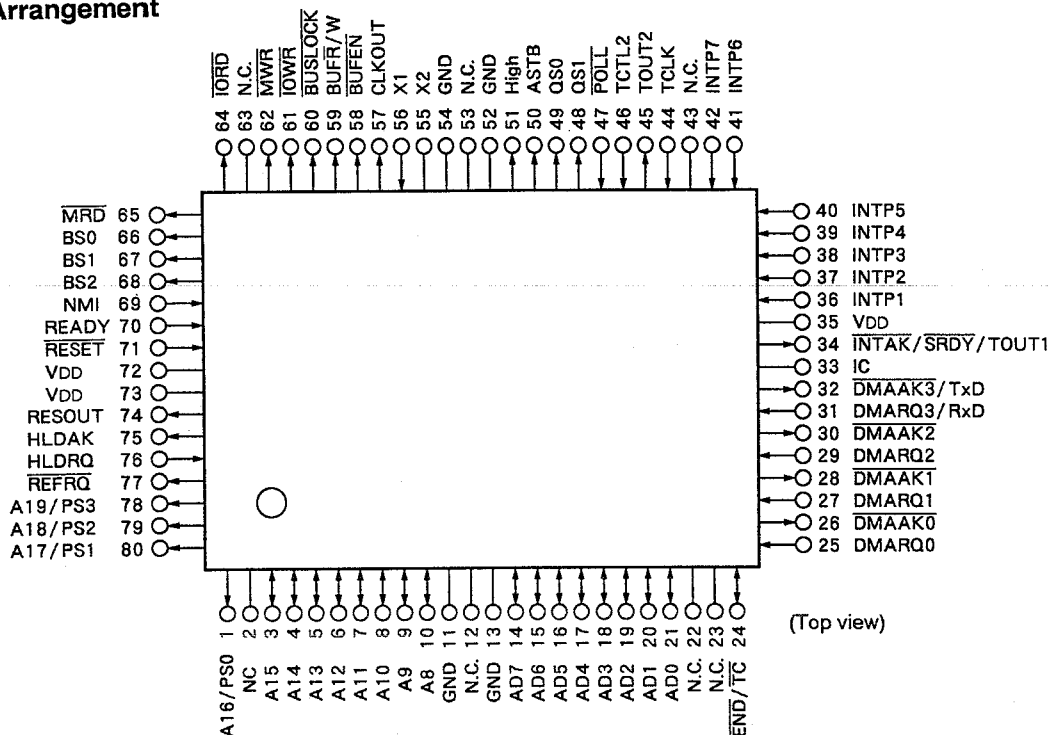


## • Block Diagram

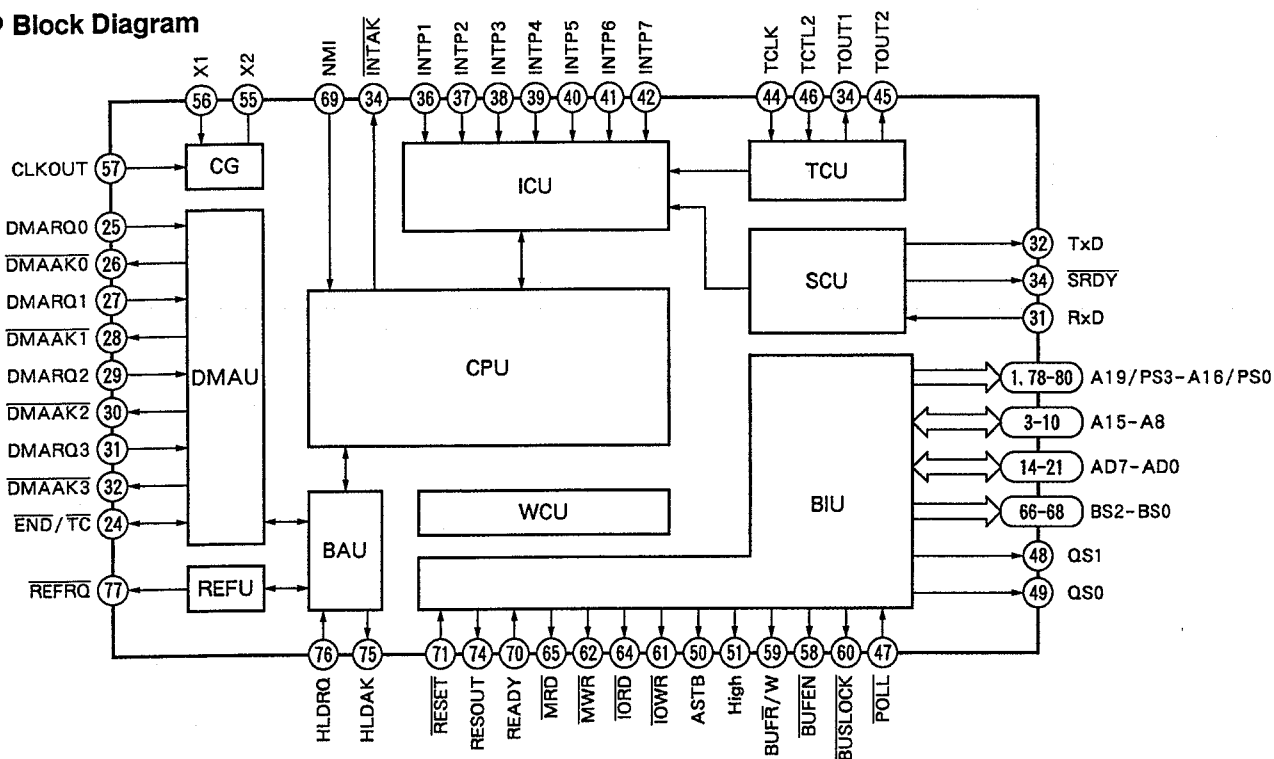


■ **UPD70208GF-10-3B9 (IC302)**  
• 16/8 bit microprocessor

● **Pin Arrangement**



● **Block Diagram**

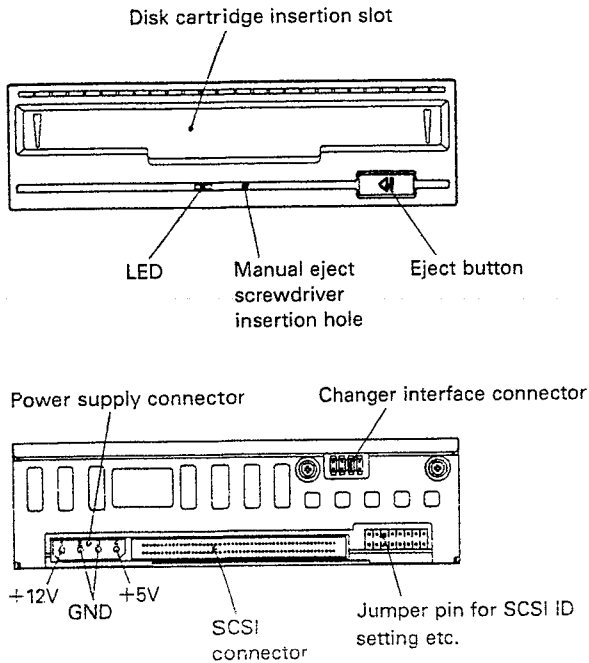


## • Pin Functions

No.	Pin Name	I/O	Function	No.	Pin Name	I/O	Function
1	A16/PS0	O *	Address/processor status of time sharing	41	INTP6	I	Mask passable interrupt
2	N.C.	—	No connection	42	INTP7		
3	A15	O *	Address bus	43	N.C.	—	No connection
4	A14			44	TCLK	I	Timer clock
5	A13			45	TOUT2	O	Timer 2 output
6	A12			46	TCTL2	I	Timer 2 control
7	A11			47	POLL	I	Polling of the floating-point operational processor
8	A10			48	QS1	O	Queue status
9	A9			49	QS0		
10	A8			50	ASTB	O	Address strobe
11	GND	—	Ground	51	High	O *	High level output
12	N.C.	—	No connection	52	GND	—	Ground
13	GND	—	Ground	53	N.C.	—	No connection
14	AD7	I/O *	Address/data bus of time sharing	54	GND	—	Ground
15	AD6			55	X2	I	Crystal/external clock
16	AD5			56	X1		
17	AD4			57	CLKOUT	O	Clock output
18	AD3			58	BUFEN	O *	Buffer enable
19	AD2			59	BUFR/W	O *	Buffer read/write
20	AD1			60	BUSLOCK	O *	Bus lock
21	AD0			61	IOWR	O *	I/O write strobe
22	N.C.	—	No connection	62	MWR	O *	Memory write strobe
23	N.C.	—	No connection	63	N.C.	—	No connection
24	END/TC	I/O	DMA service forced end/DMA service end	64	IOR	O *	I/O read strobe
25	DMARQ0	I	DMA requirement	65	MRD	O *	Memory read strobe
26	DMAAK0	O	DMA acknowledge	66	BS0	O *	Bus status
27	DMARQ1	I	DMA requirement	67	BS1		
28	DMAAK1	O	DMA acknowledge	68	BS2		
29	DMARQ2	I	DMA requirement	69	NMI	I	No mask interrupt
30	DMAAK2	O	DMA acknowledge	70	READY	I	Bus cycle end
31	DMARQ3/RxD	I	DMA requirement 3/Serial reception data	71	RESET	I	Reset
32	DMAAK3/TxD	O	DMA acknowledge 3/Serial transmission data	72	VDD	—	+5V
33	IC	—	Not connect	73	VDD	—	+5V
34	INTAK/SRDY/TOUT1	O	Interrupt acknowledge/Serial reception passable/Timer 1 output	74	RESOUT	O	System reset output
35	VDD	—	+5V	75	HLDK	O	Bus hold acknowledge
36	INTP1	I	Mask passable interrupt	76	HLDRQ	I	Bus hold requirement
37	INTP2			77	REFRQ	O	Refresh requirement
38	INTP3			78	A19/PS3	O *	Address/processor status of time sharing
39	INTP4			79	A18/PS2		
40	INTP5			80	A17/PS1		

\*: 3 states

## 8. PANEL FACILITIES



## 9. SPECIFICATIONS

- Interface : SCSI<sup>\*1</sup>
- Rotational speed : 2400 rpm, CAV
- Bit error rate : Less than  $10^{-12}$  (when using PIONEER optical disks DEC-702 and when using DC-502A)
- Dimensions : Refer to P.12 for the figure of dimensions.
- Weight : 1.4 kg (3 lb, 1 oz)
- Power supply conditions<sup>\*2</sup> : +5 V, 1.1 A typ, 2.0 A max  
: +12 V, 0.5 A typ, 2.0 A max
- Available positioning : Horizontal or vertical
- Environmental conditions
  - Operating temperature : +5°C — +40°C (+41°F — +104°F)
  - Operating humidity : 10 % — 80 % RH (no condensation)
  - Storage temperature : -20°C — +50°C (-4°F — +122°F)
  - Storage humidity : 10 % — 90 % RH (no condensation)

<sup>\*1</sup> SCSI ..... Small Computer System Interface

<sup>\*2</sup> The typical value is the value when the drive is not executing a command.